

E-SCOOTERS WITHIN DUNEDIN CITY: A SUSTAINABLE OUTREACH PROJECT

Emma Anderton, Gemma Clydesdale, Hannah Collins, Derelle Ferguson, Georgia Hatton, Emily McRae, Gabriella Perry, Shana Pohe, Eliza Poulter, Hannah Press, Genevieve Scurr, Hannah Van Der Geest, and Dr Jean Ross.



Figure 1. Parked Lime Scooters. Source: Authors.

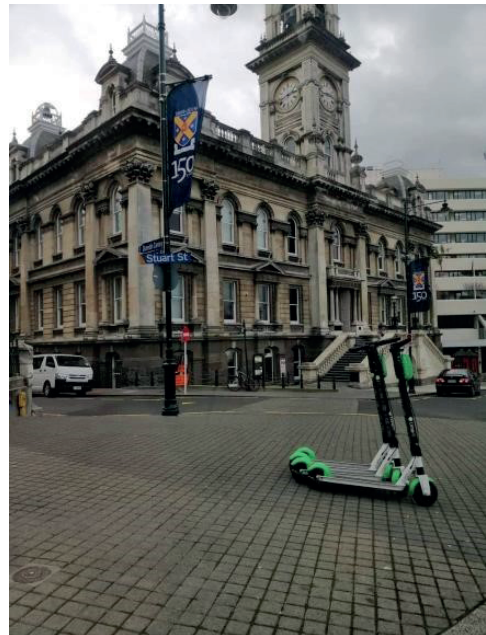


Figure 2. Lime Scooters in Dunedin. Source: Authors.

INTRODUCTION

As third-year nursing students, part of our course requirements for our Primary Health clinical placement was to develop a health promotion activity for a chosen community. Our group began this project by identifying the controversy of e-scooters within the Dunedin City, based on news articles, word-of-mouth and personal views. The e-scooter community is rapidly growing within Dunedin (Figure 1. and 2.) since the launch and distribution of 300 'Lime' scooters on 10 January, 2019 (personal correspondence, 2019). Within six months, this number had grown to 850. Our enthusiasm to identify the benefits and risks of e-scooters began to grow once we identified a geographical area that we called the 'e-scooter community'. This community was created by our group as the location in which we viewed the majority of e-scooters being used. We identified members within the geographical area who use or are impacted by the use of e-scooters as the population of interest.

We spoke to a range of professionals within the community to assist us in primary data collection. From there we evaluated both the positive and negative implications of e-scooters within the community. We then compared them to the United Nations Sustainable Development Goals to identify how they contribute to creating a sustainable future.

GEOGRAPHICAL AREA

Dunedin City is located on the east coast of the South Island, surrounding the Otago Harbour. The city is set amongst the hills and holds some of the steepest streets in the world. As the terrain in Dunedin is a combination of both flat land and hills, the benefits of e-scooters are limited to areas where there is flat land. The majority of the larger institutions such as the university, polytechnic, stadium, multiple supermarkets, and malls are all located on the flat part of North and Central Dunedin, and individuals can easily use the e-scooters to access these institutions.

Dunedin has a coastal and temperate climate bringing warm weather in summer, occasionally reaching a temperature that would be considered hot (University of Otago, n.d.). In winter temperatures are often cooler, bringing an occasional snowfall. Frost and black ice are familiar with the winter months in Dunedin.

We created a geographical area based on our personal views of e-scooter prevalence/usage within Dunedin. This area reached from North Dunedin, to South Dunedin and up to Mornington. We focussed our project on the chosen geographical area, and collected secondary data on that area and the surrounding areas within Dunedin City using the Anderson and McFarlane community assessment wheel (Anderson & McFarlane, 2000).

E-SCOOTERS IN THE COMMUNITY

An electric scooter is designed like a traditional push scooter with two wheels but is larger in size with an electric motor (New Zealand Transport Agency [NZTA], 2019). These scooters are a method of sustainable travel and are available in many areas within New Zealand. They are designed to be used on the footpath, the road as well as designated cycle lanes (NZTA, 2019). A helmet is not legally required to use an e-scooter but is recommended (NZTA, 2019). On the road, these scooters must be operated as close to the side of the road as possible (NZTA, 2019). There are many brands of e-scooters such as BEAM, Flamingo, WAVE, Jump and Lime (Deguara, 2019). In Dunedin, 'Lime' is an e-scooter option available to the public. Through the use of e-scooters and smart bikes, Lime aims to minimise traffic congestion, and promote healthier living. They believe that this can be achieved with e-scooters without subsidies or public funding (Lime, n.d. (b)). The most common users of e-scooters in Dunedin were those between 18-25 years of age (Community member, personal communication, 2019).

Dunedin has a range of transport options available, making it easy to travel around the city. There is a bus service that provides public transport around the city and surrounding areas. At the time of writing, an adult fare to travel one zone was \$2.60, or \$1.92 with a GoCard (Otago Regional Council, 2019). The average starting fare for taxi companies in Dunedin is \$3.00, from there the tariff is usually \$3.00 per km (Backpacker Guide NZ, 2019). The addition of e-scooters to Dunedin provides a new way of transportation, the cost of Lime scooters are \$1.00 to unlock plus \$0.38 per minute. The majority of households own at least one private vehicle which is the most popular mode of transport within our geographic location. However, as the roads become more congested, and when considering the price and difficulty of parking, it is not a surprise that e-scooters are becoming increasingly popular for their accessibility, sustainability, connection to nature, and fun way to get from 'A' to 'B.'

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The United Nations developed 17 goals (Figure 3.) to achieve a more sustainable future. These goals recognise current challenges the globe face including: poverty, inequality, climate, environmental degradation, prosperity, peace, and justice. The Sustainable Development Goals highlight the need for all 17 to be implemented by the target year of 2030 (United Nations, n.d.). As part of our project, we considered how e-scooters could relate to these goals and contribute towards a healthier more sustainable future.



Figure 3. United Nations 17 Sustainable Development Goals. Source: https://upload.wikimedia.org/wikipedia/commons/4/46/Sustainable_Development_Goals.jpg

The authors have found that the addition of e-scooters to the community have contributed to meeting nine of the Sustainable Development Goals created by the United Nations, specifically Goals 3, 4, 7, 8, 9, 11, 12, 13, and 17.

Goal 3: Good health and wellbeing. "Ensuring healthy lives and promoting the well-being for all at all ages is essential to sustainable development" (United Nations, n.d.).

Active transport such as e-scooters contributes to better health and well-being, and better mental well-being, while also enhances connectedness for individuals in the community. Other benefits include improved social well-being and a greater sense of community (Healthy Spaces & Places 2016).

Goal 4: Quality education. "Obtaining a quality education is the foundation to improving people's lives and sustainable development" (United Nations, n.d.).

E-scooters appeared somewhat overnight. They have required no education to be given about their use and how to stay safe whilst using this method of transport. This information must be pursued by an individual and is often difficult to find. There is a range of informative videos around the use of Lime scooters that have been launched by

the company. They are easy to access on YouTube and easy to understand. Those using and being affected by the use of scooters would benefit from compulsory education around how this transport is to be used and how those who aren't using it can keep safe.

Goal 7: Affordable and clean energy. "Energy is central to nearly every major challenge and opportunity" (United Nations, n.d.).

E-scooters are gradually becoming a new means of transport globally. E-scooters have the ability to incorporate solar panels within them, although the technology is not there yet. With the transition to solar-powered e-scooters, not only would our carbon footprint decrease, but also would create a cleaner, more sustainable environment- thus, intertwining with the United Nation's Goal 11 **Sustainable Cities and Communities**.

Goal 8: Decent work and economic growth. "Sustainable economic growth will require societies to create the conditions that allow people to have quality jobs" (United Nations, n.d.).

Through the introduction of e-scooters to Dunedin, jobs have been created. Lime employs approximately 25-30 staff who hold roles such as supply chain managers and lawyers. They are also contract approximately 100 juicers who, as independent contractors, can decide upon their own hours of work (Professional in the community, personal communication, 2019).

Goal 9: Industry, innovation and infrastructure. "Investments in infrastructure are crucial to achieving sustainable development" (United Nations, n.d.).

The Dunedin City Council has a 10-year plan that incorporates changes to the infrastructure of Dunedin. Dunedin is a growing city and developments of cycle ways and the bus hub will improve access to the city centre. They encourage residents to cycle and use other forms of transport such as e-scooters as an environmentally-friendly mode of transport to, from and around the city (Dunedin City Council, n.d.)().

Goal 11: Sustainable cities and communities. "There needs to be a future in which cities provide opportunities for all, with access to basic services, energy, housing, transportation and more." (United Nations, n.d.).

The release of e-scooters in the city of Dunedin provides a sustainable, affordable mode of transport. E-scooters are changing the way pedestrians are moving around the city. It has been witnessed and evidenced that people are choosing to use e-scooters to travel from 'A' to 'B' rather than driving their cars. This has led Dunedin people taking new routes which benefit shop owners that sit outside of the traditional one-way-system. E-scooters are quiet, which means no noise pollution, they are also carbon-free which will change the air we breathe. The addition of e-scooters to Dunedin hopes for the streets to become cleaner, healthier and safer, giving the city more of a community feel.

Goal 12: Responsible production and consumption. "Responsible Production and Consumption" (United Nations, n.d.).

E-scooters offer a 100 percent carbon-free mode of transportation, which will help reduce air pollution by decreasing the number of vehicles on the roads (Fourtane, 2019). E-scooters offer a mode of transport that is environmentally and economically friendly than other modes of transport (cars, trucks, taxis and Uber cars, public transport).

Goal 13: Climate action. "Climate change is a global challenge that affects everyone, everywhere" (United Nations, n.d.).

E-scooters in the community provide an alternative form of transportation that contributes significantly less to the emission of carbon dioxide than other forms of transportation (Nocerino, Colorni, Lia, & Luè, 2016). Carbon dioxide emissions largely affects climate change and therefore through the option of a cleaner mechanism of

transportation e-scooters are able to contribute to this goal of taking climate action (Dijk, Orsato, & Kemp, 2013).

Goal 17: Partnership for the goals. "Revitalize the global partnership for sustainable development" (United Nations, n.d.).

New Zealand government agencies are working together to promote the safe and sustainable use of e-scooters, encouraging a more sustainable future due to decreasing our car-centric society. Leading e-scooter companies in New Zealand are learning from other countries that have implemented active transport and micro-mobility. E-scooters are a step towards a more sustainable world, however, the world must work in partnership for efforts to be effective.

PROS AND CONS OF E-SCOOTERS

From the authors' primary and secondary data collection, it is clear that there are strong positive and negative impacts to users and non-users around the use of e-scooters on the streets.

Mental Health Benefits

As alluded to in Goal 3 of the United Nations Sustainable Development Goals, **Good health and wellbeing**, e-scooters have the ability to improve mental health. E-scooters encourage physical exercise when compared to sitting in a car or other mode of transport (Micro-Mobility Scooter Worldwide, n.d.), but more crucially, they offer an increased connection with nature which is known to improve mental well-being. According to the Mental Health Foundation (2019), five ways of achieving well-being include: feeling connected, being active, giving, taking notice, and continue to keep learning. The Mental Health Foundation claims that you can introduce any of these actions into your life, any time, and begin to feel the benefits. An e-scooter rider experiences three of these five mentioned actions: feeling connected, being active, and taking notice. An e-scooter user feels more connected to their environment and takes notice of things they may not have noticed about their surroundings while travelling in another form of transport. This encourages mindfulness and a sense of groundedness which is important to mental well-being. Overall, there is not a lot of literature to support the hypothesis that e-scooters and other forms of micro-mobility directly improve mental well-being, but as a group, we feel confident that e-scooters have the ability to do so due to the increased connection to nature and environment.

Business Opportunities

As noted above under Goal 8, the arrival of Lime e-scooters in January 2019 has directly increased the opportunity for jobs. In addition, Shaw (2019) discusses how business retailers in Auckland's downtown and CBD area have had an increase in foot traffic to their stores since the arrival of e-scooters. The arrival of e-scooters to Dunedin has brought about opportunities for different businesses. E-scooter companies such as Lime in Dunedin, park e-scooters at certain locations throughout the city giving an opportunity for businesses in that area to have different foot traffic going past the stores and allowing more opportunity for sales.

Carbon Free

E-scooters are a sustainable mode of transport, being 100 percent carbon-free. This year the government introduced The Climate Change Response (Zero-Carbon) Amendment Bill into Parliament. The Bill was introduced as a "landmark action" to help combat climate change (Ensor, 2019). The addition of e-scooters and other forms of electric transport supports New Zealand's pledge to be carbon-free by 2050 (New Zealand Foreign Affairs and Trade, 2018).

Sustainability

Through the equitable distribution of shared scooters, the aim is to reduce human dependence on personal automobiles for short distance transportation to leave future generations with a cleaner, healthier planet (Lime, n.d. (a)). E-scooters are a quick and affordable mode of transportation for short distances, and members of the community use e-scooters as a way of commuting to and from work, the grocery store, doctor's appointments and more. Lime scooters also has an option for riders to donate part of their ride to local foundations in their area or globally. .

Potential for Injury due to Lack of Helmet Use

A study completed in the US found that over a one year period, of the 249 people presenting to the emergency department with e-scooter related injuries, 40.2 percent of the injuries were head injuries (Trivedi, Liu, & Antonio, 2019). The World Health Organisation (n.d.) indicates head injuries to be a leading cause of death and disability, and identifies that wearing a helmet decreases the risk and severity of injuries by approximately 72 percent. In New Zealand, helmets are not legally required when riding an e-scooter; however the NZTA "highly recommends" they are used (NZTA, 2019).

Demotes Physical Exercise

Lime (2018) reports that around 80 percent of trips people take on their e-scooters have replaced trip that would have otherwise been taken by walking or cycling. 'Passive' modes of transport have been blamed for contributing to insufficient physical activity. The World Health Organization has identified that, worldwide, insufficient physical activity is one of the leading risk factors for death and is a key risk factor for diseases such as diabetes, cancer and cardiovascular diseases (World Health Organisation, 2018).

Impact on the Blind, Hearing Impaired, and Pedestrians

The vulnerable population affected by e-scooter use has been recognised to include visual and hearing impaired individuals. E-scooters are permitted to be driven on the footpath, as well as on the road and in some bicycle lanes. The parking, or discarding, of e-scooters on footpaths has also caused safety issues to pedestrians, especially to those who are visually impaired. Blind and visually impaired pedestrians have tripped over them and sustained injuries. Better parking of e-scooters is essential to maintain safety to all pedestrians on footpaths (Lawton, 2019a).

As e-scooters are able to be ridden on footpaths, this has risks for many hearing and visually impaired individuals.

Limited Noise

Very few e-scooters have bells on them and their silent operation makes it very hard for people to hear them coming (Lawton, 2019a). Individuals that are visually impaired are taught to listen for approaching vehicles and predict their path by the sound of deceleration and acceleration. E-scooters don't have these cues and the lack of cues causes a significant impact on these individuals physically and emotionally (Lawton, 2019a). The Blind Foundation's Chris Orr said 'footpaths should be prioritised as being safe for pedestrians' and suggests that e-scooters in New Zealand should be required to have a noise at all times while the vehicle is running (Lawton, 2019b).

Speed

E-scooters in New Zealand can reach a maximum speed of 25km/h (Lime, n.d. (b)). This has a huge impact on all pedestrians on the footpath, especially if they cannot hear or see the scooter coming. A member of the blind community believes that e-scooters should not be allowed on the footpaths after her many bad experiences with them (Lawton, 2019a). On one occasion she was crossing the street with her daughter, and the driver of the e-scooter continued to drive towards them at speed, expecting them to get out of the way, and as a consequence she was run over (Lawton, 2019a). The blind and visually impaired community have recently noticed an increased use of aids due to the safety risks created by e-scooters on the footpaths. This has resulted in individuals feeling very unsafe on the street, and using their aids make them appear 'different' from other pedestrians (Lawton, 2019a).

Financial Limitations

The use of e-scooters in Dunedin is limited by the need for users to have access to a credit or debit card and a smartphone that has data. "We know from some of our previous research that possession of these items is low amongst some socio-economic groups. We also know that even some people who do have access to a smartphone struggle to afford the data to be able to use its connectivity functions" (Fitt & Curl, 2019, p. 19). Some areas, such as South Dunedin, have been identified as having the highest socioeconomic deprivation score (10) within the Dunedin area, and 280 South Dunedin households reported having no access to telecommunications (New Zealand Parliament, 2017). Therefore, the use of e-scooters is likely to be restricted due to financial constraints.

IDENTIFIED HEALTH NEEDS

The number of e-scooters available in the Central and North Dunedin area is rapidly increasing. There is, however, very little education around the proper use of these scooters and how they can be an accessible method of transport. The topic of e-scooters is frequently in the media, and very rarely highlights the endless possibilities of this transport. The constant negative comments deter the wider community from experiencing and understanding all of the positive aspects of e-scooters. This is a method of transport which is carbon-free, sustainable, decreases demand on parking, roads, and could potentially bring many business opportunities to our selected area. However, as well as these positive aspects of e-scooters, there are many areas that need to improve in order to protect those using these scooters, and those who aren't.

After engaging with the community assessment wheel, the World Health Organisation (1986) who promotes the Ottawa Charter, and the United Nations Sustainable Development Goals, we have identified three areas in which change must be made to improve the health and wellness of riders and non-riders alike. Firstly, in order for e-scooters to be used in a way that increases well-being, proper hygiene needs to be a priority. The handle-bars of e-scooters facilitates the spread of infectious diseases and puts the affected population at risk of becoming unwell. This can also place strain on our health system and services. The second health concern is around the lack of education riders have in regards to riding the e-scooters safely. When e-scooters are used incorrectly, it increases the risk of injury to both users and non-users. The final concern is the lack of promotion and understanding of how e-scooters contribute to a healthy, more sustainable future.

RECOMMENDATIONS AND RESOURCES DEVELOPED

Our first identified health need is focussed in infection control. E-scooters are a fun, new form of transport that can be used in many positive ways. It can reduce the carbon footprint, as well as significantly impact a user's well-being. In order to maximise the benefits of e-scooters, we have identified that proper hygiene needs to be a priority.

A review of research led us to develop a pop-up prompt in the Lime Scooter application to remind users to practice safe hand-hygiene. Below is the pop-up that the authors created, which we hope to see on the Lime app when users are finishing their ride (Figure 4 & 5). The idea of this pop-up is to spark the idea for riders to participate in hand hygiene for their own safety. This allows the rider to make an informed decision about their health and hygiene.

 **E-SCOOTER** 
HAND HYGIENE

Please remember to wash your hands before and after using this scooter

Close

Figure 4. E-Scooter Application Pop-up to Prompt Hand Hygiene. Source: Authors



Figure 5. How To Wash Hands Resource. Source: Authors

Our second identified need was around the safety concerns that e-scooters pose. Whether you are a user or a non-user of this form of active transport, there is a potential risk for harm. After speaking with professionals in the community and researching secondary data through online articles and websites, it was clear that e-scooters posed a threat to people's health and wellbeing through injury, some cases more severe than others. Our research led us to a health promotion resource that demonstrates to the public how to correctly ride an e-scooter. The digital image shown below (Figure 6.) demonstrates the misuse of an e-scooter that may lead to injury.



Figure 6. Digital image promoting safe e-scooter use. Source: Authors

Our final identified health need, looks at the benefits e-scooters possess for the health of the environment from a rider perspective. By promoting the use of e-scooters within Dunedin, our city can progress further toward being a sustainable, environmentally friendly city. Many professionals that we spoke to in the community see Dunedin following the global sustainable leader, Amsterdam (Personal communication, 2019). Our research identifies that as we gradually eliminate issues such as traffic congestion, parking and costs, Dunedin citizens can also improve their mental wellbeing whilst riding e-scooters. As we begin to reduce carbon emissions, much like Amsterdam, we can tackle the climate change crisis.

We identified the general population of scooter users to be 18-25 years of age (Professional in the community, personal communication, 2019). Our group thought the publication of a newsletter article could aid those who don't commonly use e-scooters such as over the age of 25, or those with a lack of knowledge. The below image (Figure 7.) is what the authors developed to have published in Critic (the Otago University student magazine) and the Otago Daily Times to reach the older generations.

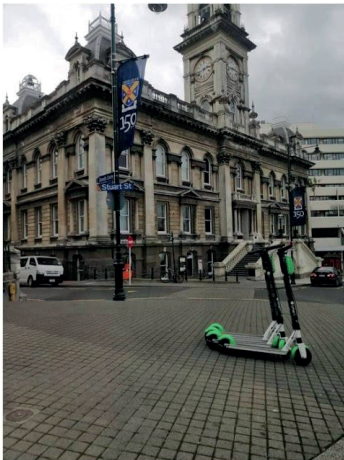
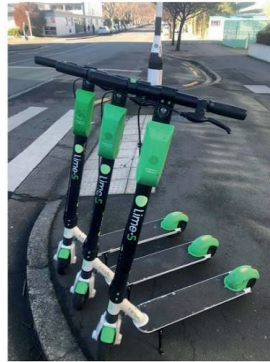
Why you should be using E-Scooters!

What are E-Scooters?

Commonly seen through Central and Northern Dunedin streets from the rental company 'Lime', these speedy machines are designed to get you from A to B. The dock-less motorised two-wheeled vehicles are designed to get you from A-to-B in a short period of time.

Who can use them?

Anybody can use a 'Lime' scooter, so long as they have a debit card, smart phone and are over the age of 18-years-old. These rental scooters cost \$1.00 to 'unlock' to use each time, with additional charges of \$0.30cents per minute of use (or \$22.80/hr). People can also purchase their own e-scooters from bike shops or online, costing \$350 or more.



What about them?

The rapid growth of the e-scooter community is shaping a sustainable future for Dunedin citizens. Amsterdam is a global example of Dunedin's future, the country is a global leader in sustainable energy management and transport. With more than 60% of inner city trips occurring via two-wheeled vehicles, they aim to reduce carbon emissions by 45% compared to levels in 1990 (Sustainable Amsterdam, 2018).

How are they sustainable?

'Lime' scooters are 100% carbon-free. They have a battery that requires charging via power outlets and have the potential to be solar-powered in the future. Their production cost is approximately 10% of the cost of a car, meaning that production of one car is equal to that of 50+ scooters.

Why should I use an E-scooter?

- They deter cars from the road and create less road congestion
- Commutes become easier and faster because people aren't struggling to find parks
- Chance to have fun and connect with nature; promotes wellbeing
 - Decreases stress and therefore associated health issues

Figure 7. E-scooter Promotion. Source: Authors

CONCLUSION

The number of e-scooters available in the Central and North Dunedin area is rapidly increasing. Due to the lack of education, riders and non-riders are being negatively impacted. There is very little education around the proper use of these scooters and how they can be an accessible method of transport. We identified that while there are significant benefits to e-scooters, there are also many areas that could be further improved to encourage safety. These include the lack of helmet laws, the risk to pedestrians from speed and silence (especially to those who are visually impaired), and poor hand hygiene.

The topic of e-scooters is frequently in the media, although the endless possibilities of this transport are very rarely highlighted. The constant negative comments deter the wider community from experiencing and understanding all of the positive aspects of these devices. This is a method of transport which is carbon-free, sustainable and decreases demand for parking, roads and could potentially bring many business opportunities to our selected area.

The authors hope to raise awareness and improve health outcomes for both users of e-scooters as well as non-users. We believe that through the implementation of these recommendations we will be able to help the community achieve a healthier, more sustainable future.

The authors of this article are learners in the Bachelor of Nursing at Otago Polytechnic, who co-authored with Associate Professor Jean Ross

Correspondance to Jean Ros, Otago Polytechnic, Dunedin. Email jean.ross@op.ac.nz

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