# E-Micromobility Safety and Regulation

Connor Young

Disclaimer: The views expressed are those of the author and do not represent those of the Transportation Planning Board.

# What’s Going On

Nationally:

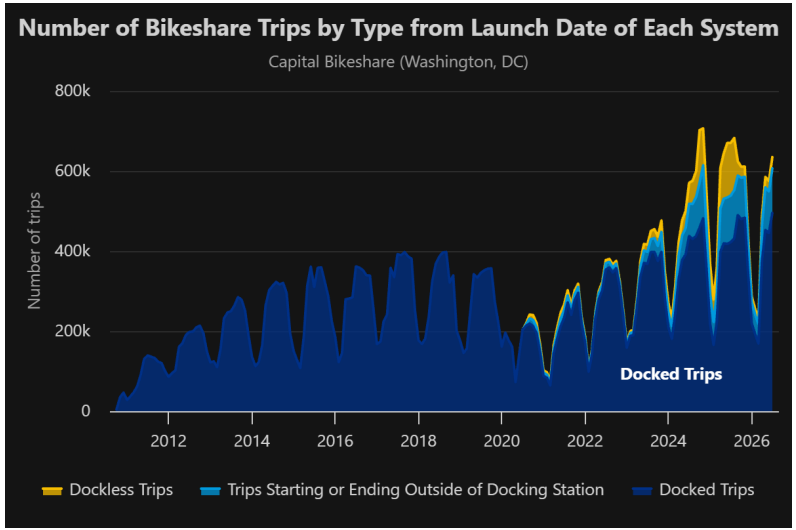
- E-bike/micromobility regulation is in the zeitgeist. For example, New Jersey just issued some regulations on e-bike ownership and use. These laws require regulation, licensing, and often insurance, and the application of this regulation is applied on new boundaries, not the existing e-bike “class” definitions. This was a reaction to a series of fatal crashes in the state and there are recent movements to exempt class 1 and 2 e-bikes from the regulation in response to backlash

Locally/Statewide:

- Virginia HB1120 directed DMV to develop recommendations on new regulations/legislation to improve e-bike/e-micromobility safety

# Why is this important now?

- E-bike/e-micromobility growth is a recent phenomenon and is shifting the transportation landscape faster than we build infrastructure, collect reliable data, or write regulations, resulting in conflicts




Bikeshare trips in CaBi system, note only e-bikes are capable of undocked trips in this system.
Source: https://data.bts.gov/stories/s/Bikeshare-and-e-scooters-in-the-U-S-/fwcs-jprj/




Comparison of national trip counts for all shared micromobility (left) vs. shared e-micromobility (right). Note that 80-90% of the growth in overall shared micromobility has been in shared e-micromobility (71/80M new trips from 2019-2025, 125/154M new trips from 2020-2025).
Source: https://nabsa.net/about/industry/

# Some Benefits of e-micromobility

- **Exercise/Activity:** Micromobility trips that replace a motorized trip, especially a car ride, increase physical activity for the rider => better health outcomes
- **Emissions:** Lifecycle emissions for e-bikes in North America are about 2% of car emissions and 3.5% of public transit emissions per passenger-mile (source: McQueen et al., 2020)
- **Infrastructure Maintenance:** Based on the 4th power law, a 350 lb. (heavy) bike-rider combo does just 0.01% of damage to road pavement that a 3500 lb. (light) car does
- **Equity/Opportunity:** Average cost of operating a car (excluding cost of car itself) = $5850/year (source: AAA). >40% of households have less than this amount in after-tax income after covering food, housing, and healthcare (source: IRS and BLS; https://www.youtube.com/watch?v=Wxdo4UpHBn4). Over 20M adults do not have a driver's license. 10's of millions Americans are not yet old enough to drive. Public transit alone is often not sufficient to meet the transportation needs of this segment of the population

# Risks/Challenges posed by e-micromobility

- **Increased speed:** Previously, space reserved for vulnerable road users like pedestrians would experience a typical speed range of something like 3-15 mph (strolling pedestrians, runners, analog bikes). More e-micromobility means more users at the upper end of that range and potentially extending the upper bound
- **More vulnerable road users interacting with motor traffic:** The capabilities of e-micromobility devices are encouraging people to spend more time outside of cars in areas where that was rare before this shift. That can mean using underused and under-designed active transportation infrastructure or even riding in mixed-traffic
- **Similar form factor, higher risk profile:** The difference in risk profile between analog bikes/scooters vs e-bikes/e-scooters vs mopeds is not visually obvious (education needed, enforcement difficult, relates to both PPE and facility use)

# E-micromobility Fatality Data

Table 1.1: Number of Reported Fatalities Associated with Micromobility Product Type and Year

| Year | All Micromobility | E-Scooter (Rental E-scooter) | Self-balancing scooter | E-Bike |
|---|---|---|---|---|
| 2017 | 5 | 1 | 4 | 0 |
| 2018 | 11 | 5 (2) | 0 | 6 |
| 2019 | 31 | 25 (7) | 0 | 6 |
| 2020 | 36 | 16 (3) | 2 | 18 |
| 2021 | 83 | 40 (1) | 8 | 35 |
| 2022 | 95 | 35 (1) | 3 | 57 |
| 2023 | 137 | 46 (0) | 0 | 91 |
| 2024 | 135 | 38 (0) | 0 | 97 |
| **Total** | **533** | **206 (14)** | **17** | **310** |

Note: Reporting for 2023-2024 is ongoing. Counts may change in future reports.
Source: CPSRMS, NEISS, U.S. Consumer Product Safety Commission, 2017-2024.

Table 1.4: Reported Fatalities Associated with Micromobility Product Type and Associated Hazards (2017–2024 Total)

| Hazard Pattern | All Micromobility | E-Scooter (Rental E-scooter) | Self-balancing scooter | E-bike |
|---|---|---|---|---|
| Motor vehicle accident | 312 | 140 (13) | 2 | 170 |
| Control issues | 81 | 20 (1) | 0 | 61 |
| Fire hazards | 45 | 15 | 11 | 19 |
| Pedestrian accident | 25 | 6 | 0 | 19 |
| Pavement | 3 | 2 | 0 | 1 |
| Other | 7 | 2 | 0 | 5 |
| Unspecified falls | 60 | 21 | 4 | 35 |
| **Total** | **533** | **206 (14)** | **17** | **310** |

Note: Reporting for 2021-2023 is ongoing. Counts may change in future reports.
Source: CPSRMS, NEISS, U.S. Consumer Product Safety Commission, 2017-2024.

CPSC data on e-micromobility fatalities, including both riders and non-riders (e.g.: pedestrians).

- Fatality count is growing at a similar clip to ridership, no indication that the act of riding e-mobility is significantly more dangerous now than it was in the past, but more people are doing so, resulting in bigger numbers.
- Roughly 60% of micro-mobility fatalities are interactions with motor vehicles, compared to <5% as interaction with pedestrians (pedestrians represent 19/25 listed fatalities, the other 6 were e-bike riders who died in collisions with pedestrians or other bicyclists). CPSC data on e-micromobility ER visits suggest a similar pattern where most injuries are to riders and occur on paved roads

# Historical Context/Comparison

In the first half of the 20th century: cars became more frequent road users, and started killing pedestrians and children by the thousands. In 1923, Cincinnati proposed mandating speed limiters on cars operating within the city to prevent speeds over 25 mph. The referendum failed and car use continued to climb, leading to our auto-centric society.

Now: E-micromobility users are becoming more common, and cars are killing them by the hundreds. These devices are already legally mandated to be speed-limited. Car use continues to climb, as do pedestrian deaths.

# Existing Regulation (I am not a lawyer)

Virginia:

- Class-3 e-bike riders must wear helmets and be either 14+ or supervised
- E-Scooters capped at 20 mph, riders must be 14+ or supervised
- Mopeds (>Class 3) must be registered. Riders must wear helmets, be 16+, and carry photo ID

Maryland:

- Class-3 e-bike riders must be 16+ and are restricted to certain bike facilities (on-street lanes, generally)
- E-scooters capped at 20mph (15mph for Baltimore), treated as bikes
- Mopeds must be registered/titled. Riders must wear helmets, be 16+, have license/moped permit

DC:

- All e-bike riders must be 16+, class 3 e-bikes do not meet definition of “legal e-bike”
- E-scooter riders must be 16+, although legislation is focused on rental scooters, not private devices
- Mopeds are treated as motor vehicles

# Potential Non-regulatory Solutions

- Increased education: This can include explaining existing regulation to the public, classes promoting safe bike riding practices, traffic safety courses/activities, etc.
- Enforce existing regulations. For example, MPD recently impounded more than 300 illegal mopeds and scooters.
- Increased space/facilities available for active transportation, including separation of low-speed and medium-speed active transportation users: Protected bike lanes, replacing narrow sidewalks with wider multi-use paths, etc. reduce the conflict points between e-micromobility and pedestrians. Safer intersection and crosswalk treatments reduce and de-risk conflict points between cars and vulnerable road users

# Local Advocacy Highlights

- Context: I’m a member of a local advocacy group (Active Prince William) that pushes for better active transportation infrastructure in and around my area. Opinions in this presentation are my own.
- Manassas City recently installed a traffic garden (https://www.trafficgardens.com/whatisatrafficgarden), the first piece of bicycle safety education infrastructure in the city!
- Members are actively participating in public hearings and communicating with local lawmakers to advocate for active transportation infrastructure and against policies/agendas that are not well-targeted and would have undue negative impacts on legal and safe micromobility ridership

# Appendix: Personal Anecdotes

# Appendix: Personal Anecdote 1: Helmet use/laws

I taught myself how to ride a bike in 2022, and bought an e-bike shortly after as a primary mode of transportation. The e-bike gave me confidence that I would be able to get places and carry cargo in the city that an analog bike wouldn't have, thanks to low-density development (longer trips necessary), hilly terrain and poorly graded bike paths, and gaps in the bike network where riding in traffic is the only available option. At first, I didn't wear a helmet, because I was comfortable with the risk profile of riding a bike without a helmet and didn't fully grasp the difference that electric assist made to that risk profile. After a pretty bad argument between my face and the curb/sidewalk as I tried to avoid a car, I now always wear a helmet. But I'm a weak advocate for helmet laws because of the negative impact that could have on bikeshare ridership and the indirect negative impact that would have on demand for better, safer bike infrastructure. I support helmet laws that focus on mandatory signage for bikeshare operators and education/promotion programs, but am against imposing penalties on helmet-deficient riders

# Appendix: Personal Anecdote 2: Bike Speed and Motor Usage

When I ride my Class 2 e-bike, I don't use the throttle unless my pedal assist sensor is broken (has happened to me a couple times, but less than once/year and I consider myself unlucky) and I rarely exceed 15 mph outside of downhill sections and mixed-traffic riding. This is partially down to my behavior, but it is also a function of the bike's design. The throttle is less convenient than pedal-assist to operate, and pedaling at the rate necessary to exceed 15 mph on flat or inclined terrain requires noticeable effort, so I only do it when I feel the need to. There are bike design features (e.g.: non-adjustable seats, very high wattage motors, fat tires) that shift the balance away from this behavior and towards more motorcycle/moped-like operation. I wonder if disincentivizing these features (e.g.: exempting bikes that possess these features from rebates/incentive programs) would create a safer mix of micromobility vehicles.