EFFECTIVELY DEPLOYING SHARED MICROMOBILITY

By Tracy Sanders, Ph.D., and Elizabeth Karpinski

Micromobility devices represent a paradigm shift from our current auto-oriented transportation system: evidence indicates that shared micromobility may be more efficient, cheaper, and less damaging to the environment for certain trips. Dockless e-scooters are a prime example of "shared micromobility," a new category of light, single-occupancy vehicles available for short-term rentals.

These devices can fill the "last mile" gap problem in public transportation, increase local employment, improve transportation equity, and increase the safety of the overall transportation system. A successor to the self-balancing Segway and children's kick scooters, dockless shared e-scooters began appearing in U.S. markets in 2017. By 2018 they were in nearly 100 cities, and deployment reached a high of 117 cities in 2019, before contracting to just 89 cities in 2020 (Bureau of Transportation Statistics, 2021). Usage has also expanded, with the number of shared micromobility trips increasing 289% between 2017 and 2019 due to e-scooters (CB Insights, 2021).

While evidence suggests the potential public benefits of shared micromobility are numerous, so are the obstacles to its widespread adoption. Policies and regulations that encourage broad and effective adoption of micromobility transportation would likely have better outcomes if more informed, data-driven policy decisions were made at the local level. Measuring the potential tradeoff in risk is difficult, and accounting for transportation injuries and fatalities is complicated. The difficulty in harmonizing data, safety, and regulations between communities and among various levels of government is at the core of these challenges.

Challenges Impede Effective Deployment

MITRE has been assessing the impacts of micromobility, providing guidance to planners who are implementing new micromobility programs, and modeling safety outcomes. Through this work, we have gained valuable insights into several barriers to widespread adoptions and how to tackle them. Addressing the challenges requires policymakers at all levels of government to gain a common understanding, not only of the relevant data on incidents and injuries, but also of the ways to fashion effective policies that function across various communities.

Lack of a Comprehensive Understanding of Data

Our recent work suggests that there is not a comprehensive or consistent understanding of micromobility safety impacts (Karpinski, Bayles, & Sanders, *in press*). Different sources of data provide researchers and policymakers with different perspectives on transportation incidents. For instance, insurance data are based on incidents that result in insurance claims, law enforcement data are based on incidents that involve the police, and healthcare data are based on interactions with the healthcare system. The disjointed data practices mean that many micromobility incidents may be unaccounted for, including those involving people without insurance, collisions resolved without law enforcement, and injuries that do not receive medical attention. Further, differences in data collection and recording techniques can impact findings. For example, when evaluating the source of bicycle injuries, most police records pertaining to bicycle crashes involved a motor vehicle (Reynolds, 2018), but most cyclists visiting the emergency room were not injured by a motor vehicle (Stranges, Uscher-Pines, & Stocks, 2012). This discrepancy occurs because police are more likely to be involved in crashes involving motor vehicles. Among the stakeholders involved, micromobility providers have access to additional useful data, including complete usage data and crash data from incidents that do not necessarily show up in injury datasets. Unfortunately, these companies have no incentive to share these data and many agreements between micromobility providers and cities do not include a data-sharing requirement.

Since insurance and police data on e-scooter incidents is almost non-existent, most studies rely on emergency room and urgent care data to assess injuries. Because new micromobility devices such as e-scooters have only recently become popular, major coding schemas for injuries and mortality often lack standardized fields to describe them. Differentiating between different kinds of micromobility and mobility devices, such as mobility scooters, kick scooters, and e-bikes can also be difficult for witnesses to identify or describe, and even more so for law enforcement officials who may get the information after an incident has occurred.

DID YOU KNOW?

Since micromobility devices are lighter in weight than personal automobiles, they use much less energy to move. Tillemann and Feasley (2018) estimate that an e-scooter can go eighty times farther than a gas-powered automobile, using the same amount of energy. A recent study from the National Renewable Energy Laboratory suggests that high adoption of micromobility could save the equivalent of 2.3 billion gallons of gasoline per year (Sun, Garikapati, Wilson, & Duval, 2021), reducing energy consumption of passenger travel by 2.6%, which could alleviate some of the air pollution problem in many urban centers.

Safety Impacts of Transportation Modes are Difficult to Compare

Not all injuries are equal. Some evidence suggests that micromobility devices are particularly prone to high-frequency, low severity injuries (Trivedi et al., 2020). However, this is difficult to confirm because of limited data availability and the difficulty of making

comparisons between different modes of transportation. In addition, quantitative data can leave out valuable context that helps pinpoint how accidents take place. Whether the injuries are from a fall or a collision with a motor vehicle, for example, changes what we know about the source of the risk, and where intervention efforts should be targeted.

Statistics regarding transportation fatalities are widely recorded, objective, and binary, and cover discrete incidents. While these statistics may provide more clear-cut information than data regarding transportation accidents that result in non-fatal injuries, the criteria for attributing fatalities conceals complexities. The Fatality Analysis Reporting System (FARS), the data collection and distribution system for National Highway Traffic Safety Administration (NHTSA), is designed to capture most fatalities involving motor vehicles on public roads. This means that the FARS database only contains information regarding traffic fatalities that involve motor vehicles on public travel ways, when the death occurs within 30 days of the crash. This motor vehicle-centric lens undercounts pedestrian fatalities in FARS by approximately 20% every year (National Safety Council, 2021).

Fatalities involving micromobility (especially motorized) are likely to be undercounted even more than pedestrian fatalities because: shared micromobility devices can crash at higher speeds without motor vehicles involved, they often travel (and crash) on non-public travel ways such as private roads or parking lots, and micromobility fatalities may also be more likely to occur outside of the 30-day window if the types of injuries sustained in micromobility crashes are different (e.g., head injuries). On the other hand, if micromobility fatalities are defined by broader criteria than other transportation-related fatalities, then the safety impacts are hard to compare.

Comparisons with other modes are also riddled with problems. For instance, transit and train fatalities count deaths that occur during routine maintenance, regardless of whether they involve a collision. Following this method, incidents involving e-scooter charging such as a recent fire that led to the death of a 9-year-old boy (Associated Press, 2021) could be included in fatality statistics. Similarly, an incident where an e-scooter was used as a weapon (Martin, 2019) could be considered a micromobility-related injury. These incidents illustrate the complexities around micromobility safety and how incidents are recorded.

Federal, State, and Local Policies Lack Harmony

The regulatory and policy structure governing micromobility is complex, relying on a mix of rules from the local, state, and federal levels and differing by jurisdiction. Since its technology and widespread deployment are so recent and unlike its predecessors, shared micromobility does not fit neatly into traditional regulatory structures.

Some transportation policy is initiated at the federal level. Previous federal transportation advances like seat belts have been championed by NHTSA. However, since NHTSA does not generally consider motorized micromobility devices to be motor vehicles, they do not regulate them (NHTSA, n.d.). While the Consumer Product Safety Commission regulates specifications for micromobility devices, they do not regulate their role on the roads.

In the absence of federal guidance, micromobility is inconsistently regulated by state and local governments. The state is the primary nexus for surface transportation policies. State-level initiatives may or may not provide regulatory "home rule" rights to local jurisdictions, meaning that some states' e-scooter regulations apply to the local jurisdictions, while others do not. State agencies generally determine whether a

DID YOU KNOW?

Shared micromobility advocates are studying whether it improves transportation equity. The pay-as-you-go model makes this mode particularly cost-effective and easy to acquire. Unlike personal automobiles, there is no initial "buy-in" cost, and it does not require the rider to provide fuel, insurance, or maintenance. Further, many cities require micromobility providers to offer programs that ensure equitable access to underserved communities.

Department of Motor Vehicles registration or driver's license is required, the minimum age to ride, and helmet laws.

Local agencies generally determine regulations directly impacting e-scooter providers and riders, such as vehicle location, limits of overall scale and impact, rider and public safety, operator responsibilities, social equity considerations, data-sharing requirements and standards, device speed, and risk management (Murphy et al., 2021). The wants and needs of individual communities, including their equitable access to micromobility, are addressed on the local level. State and federal policies can support uniform policy development in these local regions, but do not necessarily address their unique local concerns.

Sometimes, neighboring local governments have inconsistent micromobility rules that cause confusion. Compounding this issue, boundaries between these jurisdictions are not often clear. In these cases, both riders and nonriders must know the rules for multiple jurisdictions in order to comply with those rules. This can be especially dangerous when the rules about where micromobility devices are legal to ride differ since automobile drivers and micromobility users must often share the same roadways.

Recommendations for the Safe Deployment of Shared Micromobility

While micromobility devices offer a novel alternative to traditional transportation, many challenges relating to safety, data, and regulation remain. To better understand the impact of micromobility devices, researchers need data about they are used and how accidents arise. This is especially difficult without widespread data on injuries and fatalities.

Data

Strategies to promote better data collection and analysis include:

- Localities often negotiate data provisions with e-scooter vendors during the permitting process so that researchers and advocates can use it in their analyses, and policymakers can be better informed. State and/or or local governments should require vendors to share trip, mileage, and incident data with local governments; and make aggregated versions of such data publicly available while protecting individual user privacy.
- The federal government, through regulatory power in the Department of Health and Human Services and leadership in NHTSA; and state governments through state health regulating authorities and departments of transportation, should partner with health systems to develop standards for consistent micromobility casualty reporting. Such reporting should provide for consistent data

on the circumstances surrounding and severity of micromobility-related injuries. Also, where possible, reports should capture the source of the injuries, such as a fall or collision, and the role of the injured party, such as an e-scooter user or a pedestrian.

- NHTSA and state governments should use standardized, clearly defined terminology and coding schemas to record and publish e-scooter crash and casualty data. Leadership for such standardization should come from working committees convened by NHTSA and include the healthcare and law enforcement communities. Such standardization would result via a cooperative agreement between NHSTA and the several state governments, paralleling the structure that enables standardization in FARS.

Policy and Regulation

Regulatory and policy harmonization is also a key aspect of safety since the rules for riders and non-riders sometimes vary in neighboring jurisdictions. We recommend the following to federal, state, and local transportation agencies to clarify their respective responsibilities:

- **Federal:** Disseminate recommendations and best practices to state and local entities based on the lessons learned in the programs that have been deployed across the nation and encourage standardization in data collection and reporting. As with the FARS system, provide leadership in standardization and training to analysts at the state and local levels to boost compliance. Federal leadership is required to enable any necessary cooperative agreements between the federal government and the many states. The federal government, especially the US Department of Transportation, should provide for leadership in the form of best practices and direct or funded research around shared micromobility safety and policy recommendations. Such recommendations can be in the form of research-based model legislation for state and local governments, and recommended regulations around safe operations of micromobility devices.
- **State:** Until broader nationwide standards become adopted, states should enter into cooperative agreements with neighboring

states to standardize policies around micromobility regulations, especially when the state boundaries occur in areas with e-scooters in a shared metropolitan area (example: the DC metropolitan region has e-scooter vendors operating in the neighboring jurisdictions of the District of Columbia, Virginia, and Maryland). States should participate in nationwide efforts to standardize data collection and reporting.

- Local: Work with neighboring jurisdictions and service providers to minimize policy differences that affect micromobility riders and non-riders and provide information to residents regarding regulatory differences between jurisdictions and the location of boundaries.

Opportunity for Action

New micromobility devices such as e-scooters offer the promise of improving transportation safety, equity, efficiency, and sustainability. However, for these benefits to be realized, stakeholders must have a clear understanding of how to optimize their usage and mitigate their risks. When relevant data is more fully available, researchers and policymakers will be able to get a nationwide perspective on micromobility, fully understand safety risks, and make recommendations regarding how to best integrate micromobility into existing transportation infrastructures.

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The authors would like to acknowledge Lisa Daigle for her contributions to this work.

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