In-Depth Examination of E-Scooter Safety:
A Case Study of Austin, Texas

SAFE-D
SAFETY THROUGH DISRUPTION

The Safe-D UTC conducts innovative research, education and technology transfer guided by a vision of systematically safe transportation.

Texas A&M Transportation Institute

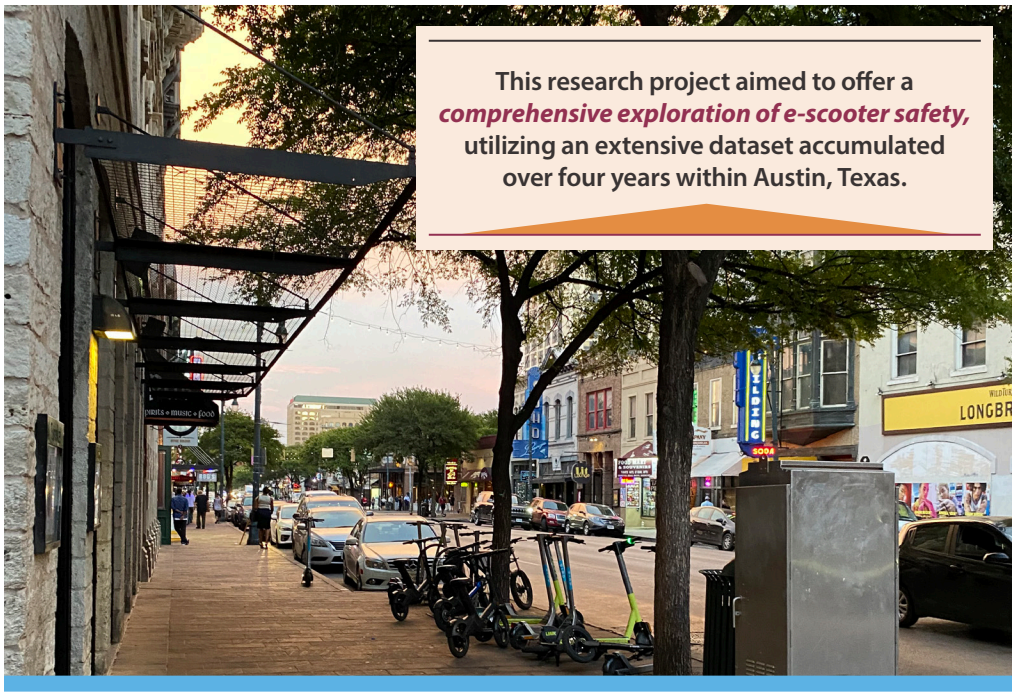
SAFETY THROUGH DISRUPTION (SAFE-D) NATIONAL UNIVERSITY TRANSPORTATION CENTER

E-scooters have rapidly become a defining feature of urban transportation, offering a convenient and environmentally friendly alternative for short trips. However, their ascent from novelty to an integral part of city mobility has not been without challenges.

Funded by the Safety through Disruption (Safe-D) University Transportation Center (UTC), this study emerged from the pressing need to address e-scooter safety concerns that have arisen since their introduction in the United States. By conducting a comprehensive analysis of the current state of e-scooter safety, this study is dedicated to fostering a safer transportation environment for e-scooter riders and other road users.

The study utilized data from two main sources, spanning a period between 2018 to 2021. Hospital emergency room records for 369 e-scooter-related patients were obtained from Dell Seton Medical Center in Austin to provide insights into the nature and severity of e-scooter-related injuries. Additionally, researchers conducted an in-depth examination of crash records from the Texas Department of Transportation's Crash Records Information System (CRIS), leading to identification of 153 police crash reports as e-scooter related.

To complement these sources, researchers collected field-based, micro-level built-environment data and integrated macro-level data, including demographic, socioeconomic and built-environment data from publicly available sources such as the city's open databases and the U.S. census.



This research project aimed to offer a ***comprehensive exploration of e-scooter safety,*** utilizing an extensive dataset accumulated over four years within Austin, Texas.

A total of ***131 crash locations in the city of Austin*** were visited, allowing for detailed information on the built-environment and infrastructure features.

As part of their initial research tasks, the researchers also conducted a thorough review of completed pilot studies and existing research to gauge the current state of e-scooter use. This review encompassed research on e-scooter-related injuries, contributing factors to e-scooter incidents, and public perceptions and concerns regarding e-scooters.

METHODOLOGY

Identify and Verify

- Data Fusion
- Text Mining
- Manual Review

Process and Analyze

- Topic Modeling
- Exploratory Analysis
- Predictive Modeling

Various methods were employed to explore the potential to merge hospital data with the CRIS data. Text mining techniques were used to pinpoint e-scooter-related crashes within the crash reports. Each e-scooter report was individually examined to gather more data and verify the information present in the CRIS data. Natural language processing techniques, specifically topic modeling, were used to generate new features and better understand the descriptive sections of crash reports. Exploratory statistical analyses were conducted to extract insights from all the datasets. Predictive modeling was performed to examine injury severity and assess the importance of various variables in distinguishing the level of injury severity in e-scooter-related crashes.

The findings highlighted the *need for improving consistency in incident and injury reporting* as well as developing and integrating data from different sources, which would help enhance the richness and robustness of data analysis and evaluation.

The findings underscore the significance of e-scooter safety and its implications for urban transportation. Key insights emerged, including the characterization of e-scooter rider injuries in terms of age, gender, and factors such as alcohol and drug use. The findings highlighted the importance of providing targeted safety education, addressing substance use, conducting infrastructure planning, and considering time/location-specific measures to enhance e-scooter safety. Notably, the analysis results also revealed the critical role of intersections in e-scooter safety, emphasizing the need for improved visibility, traffic calming measures and tailored education for micromobility riders.

The research outputs are expected to provide valuable support for policymakers and urban planners, equipping them with *data-driven insights to make informed decisions* regarding micromobility policies and safety measures.

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TTI309.SEPT23

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