Collaborative Sciences Center for ROAD SAFETY

www.roadsafety.unc.edu

Exploring Micromobility User Safety Behavior

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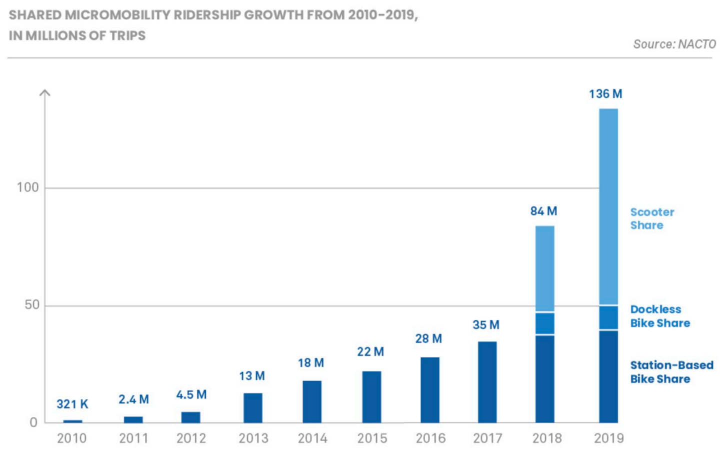
Outline (and sneak peak):

- Problem: Scooter rider safety *behavior* is largely undescribed and causes and impacts are unknown
- What we did: 1) Crash analysis, 2) direct observation, 3) survey research focusing on safety factors and perceptions leading to behaviors and injury.
- Key findings: Most fatalities involve a car and sidewalk-to-crosswalk riding behavior heavily represented in police crash data. Direct observation could confirm factors influencing safe and predictable behavior. *Consistent* surveys can reveal comparable results.
- Implications for practice: Data collection protocols can improve investment strategy to improve behavior and safety.

1) Crash Analysis

- Scooter crashes have increased and about 80% of fatal crashes (~30-50 in USA) involve a car.
- Many more car-related crashes reported in police crash reports
- We analyze two years of crashes (52) in Nashville and apply PBCAT crash typology framework. We compared to bicycle crashes (79).



https://www.roadsafety.unc.edu/research/projects/2019r26/

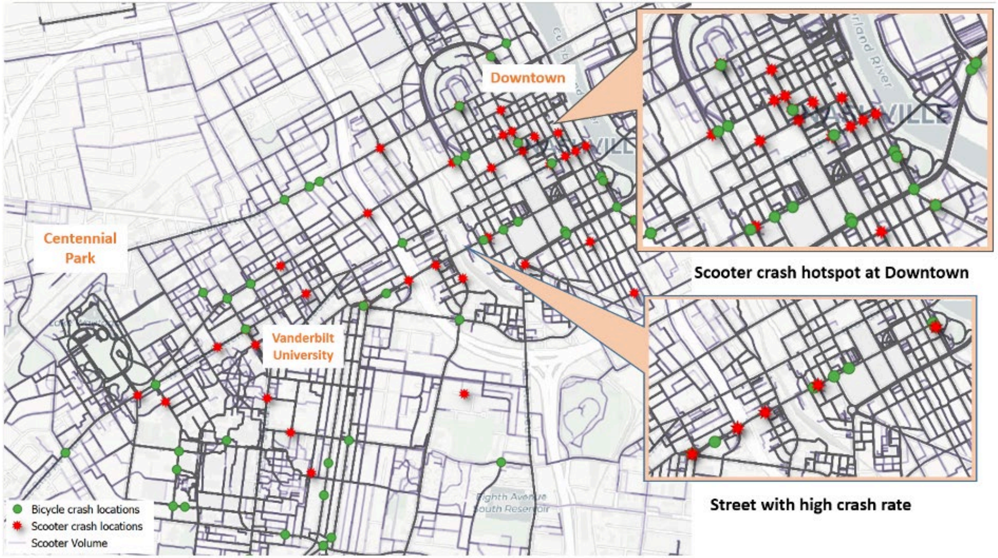
1) Crash Analysis

ELSEVIER

Journal of Safety Research
Volume 77, June 2021, Pages 217-228

Comparison of motor vehicle-involved e-scooter and bicycle crashes using standardized crash typology

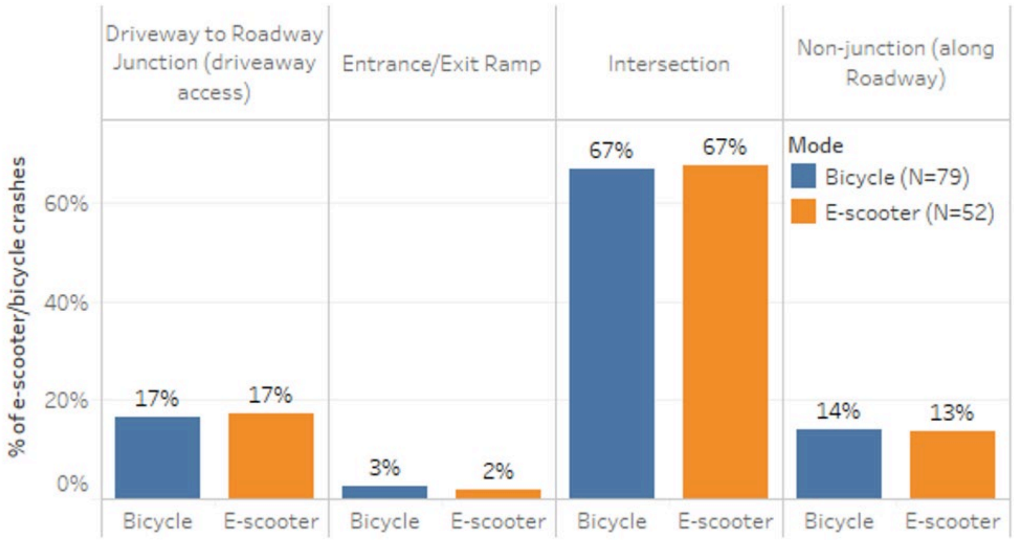
Nitesh R. Shah, Sameer Aryal, Yi Wen, Christopher R. Cherry



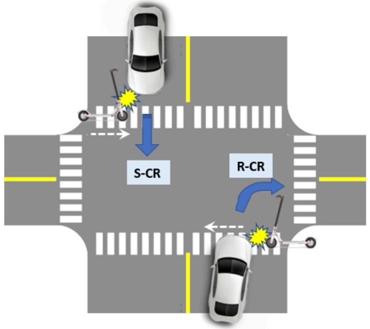
Geographic location of crashes

- E-scooter crashes were mostly concentrated in the city center of Nashville
- On the other hand, the bicycle crashes were more spatially dispersed

1) Crash Analysis



Crash location by roadway segment

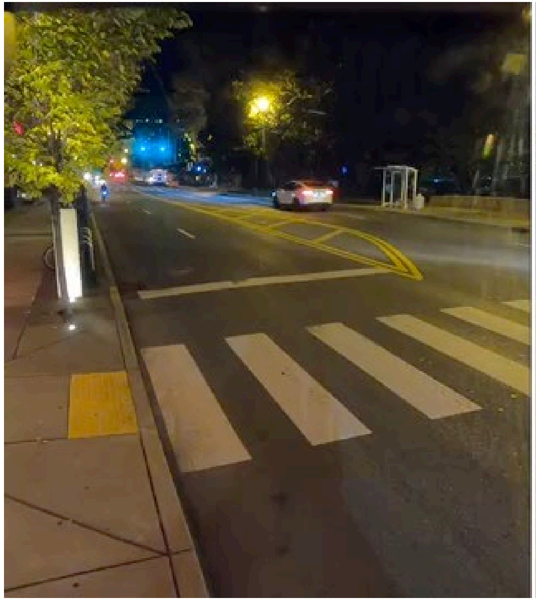


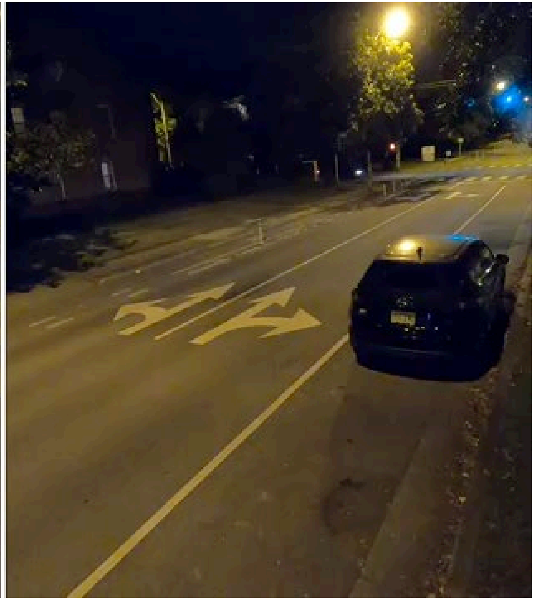
E-scooter crashes

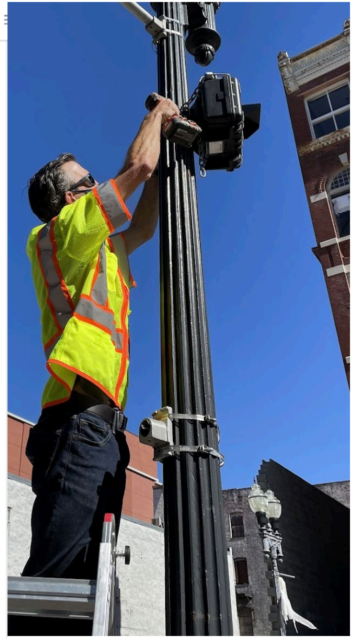
- Only a few PBCAT crash types contain the majority of e-scooter crashes
  - S-CR: 31% of all e-scooter intersection crashes
  - R-CR: 29% of all e-scooter intersection crashes
  - S-CL: 12% of all e-scooter intersection crashes

Key Finding: Most crashes occur at intersections, but scooter crashes most often occur from with collisions from driver's right. Different than bicycle crashes. This is an artifact of (opposite direction) sidewalk riding behavior (and car yielding).

2) Direct Observation Behavioral Analysis (BTSCRP 10: Nashville & Portland)







Key Finding: We’re still doing the research so no findings to reveal yet, but we’re testing an observational method to get *some* information on behavior, but not all…

3) Survey Analysis

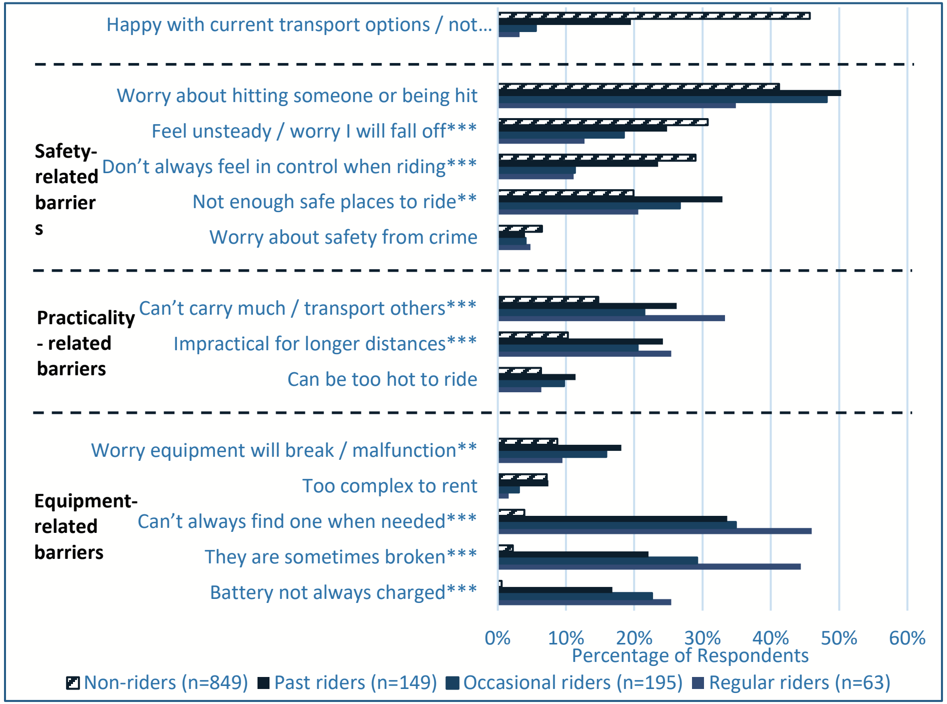
- Surveys help us understand behavioral influences and experiences such as
  - Perceptions (e.g., related to safety, comfort)
  - Motivations (e.g., related to cost, convenience)
  - Deterrents (e.g., related to weather, access)
    - Note that there is overlap between all of the above examples
  - Contributing circumstances (e.g., alcohol, cell phone usage)
  - Experiences like near misses or unreported crashes
- If done well, we can then draw conclusions about prevalence and type of experience, perception, etc.

3) Survey Analysis

- Surveys also allow us to connect findings related to factors of interest with sociodemographic data
  - Can highlight important disparities or patterns related to, e.g., gender, age, race, ability
- Surveys are also critical for learning about those who *don't* do an activity
- (A few) best practices:
  - A large sample size gives greater confidence in any of the findings, particularly if the sampling followed a framework
  - Open-response questions can provide important qualitative data to contextualize responses
  - Replicability with other surveys allows comparison across contexts

3) Survey Analysis

- Selected findings from ASU staff survey
- Online survey, emailed to list
- Guaranteed incentives offered for first 200 responses, then raffle
- N=1256; 22% response rate
- Asked about perceived benefits, barriers, near miss experiences, behaviors.

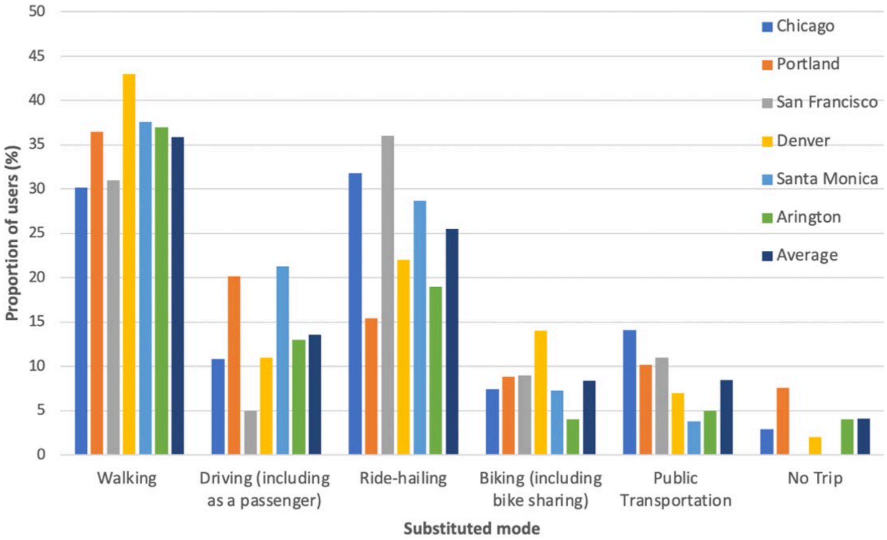


Key Finding: Perceived barriers and benefits differ across rider groups and socio-demographic characteristics.

3) Survey-of-Survey Analysis

- Not all surveys are equal or comparable

- How a question is asked is important for interpretation and drawing generalizable findings.



Thinking of your most recent SMD trip in Arlington County, if an SMD had not been available, how would you have made the trip? (P69)

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If you have used a scooter, what form of transportation has your scooter ride most often replaced? (P13)

3) Survey-of-Survey Analysis

- We developed a Survey Question Library for:
  - Practitioners
  - Operators
  - Researchers
- Provides an exhaustive list of existing questions
- And a recommended questions list that is pre-formatted
- Users can construct surveys using our library of questions that are benchmarked across different applications.

https://www.numo.global/resources/electric-scooter-survey-question-library

New Urban Mobility alliance

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[3-11] Alternative Mode

How would you complete your trip if a shared e-scooter had not been available in your last trip? (Choose one)

- ☐ Driven a personal vehicle, carshare vehicle, or other motor vehicles
- ☐ Ridden as a passenger in a vehicle and dropped off by a friend, family member, or other person
- ☐ Taken a taxi, Uber/Lyft or other ride-hailing services
- ☐ Walked
- ☐ Taken a bus/other local public transportation option
- ☐ Ridden a personal e-scooter
- ☐ Ridden the local bike share
- ☐ Ridden a personal bike
- ☐ Would not have made the trip
- ☐ Other (please specify:)

Conclude

- Key findings:
  - Most fatalities involve a car and sidewalk-to-crosswalk riding behavior heavily represented in police crash data.
  - Direct observation could confirm factors influencing safe and predictable behavior. Infrastructure matters.
  - *Consistent* surveys can reveal comparable results and capture non-observed behaviors
- Implications for practice:
  - Data collection protocols can improve investment strategy to improve behavior and safety.
  - There are many ways to collect behavior data to provide a deeper understanding for safety.
  - Standard methods (crash data) tell part of the story, direct observations tell another, surveys tell another.

Thanks, Acknowledgment, and Questions.

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