



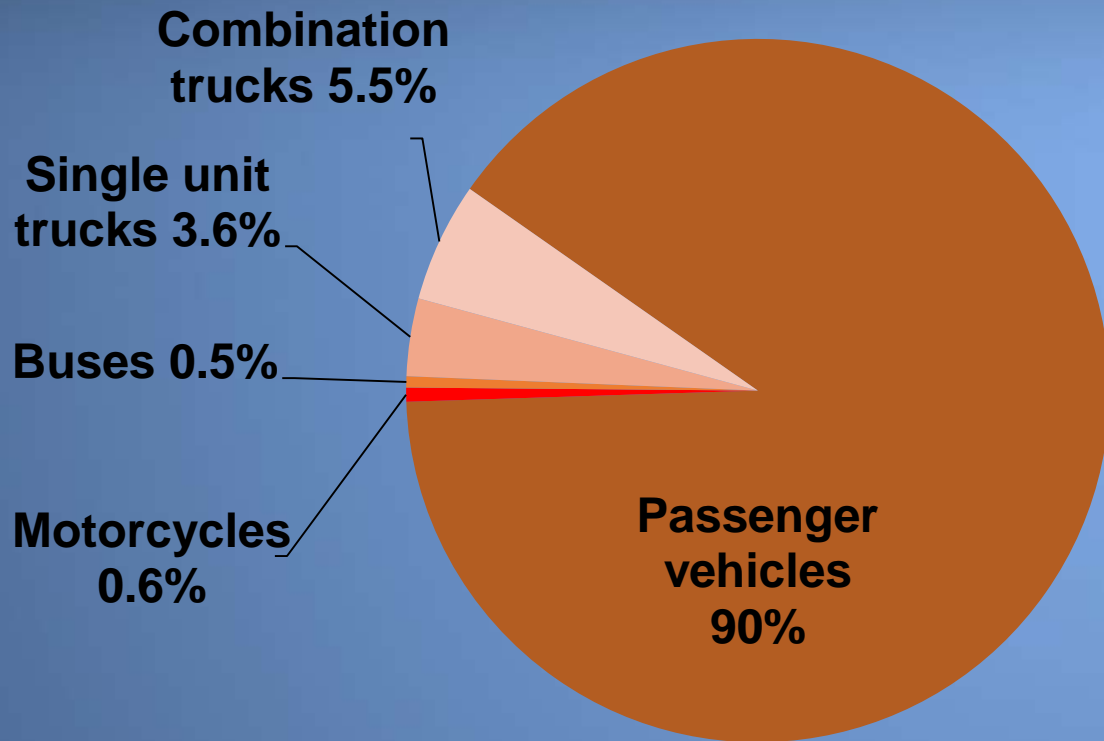
**National
Transportation
Safety Board**

Select Risk Factors Associated with Causes of Motorcycle Crashes

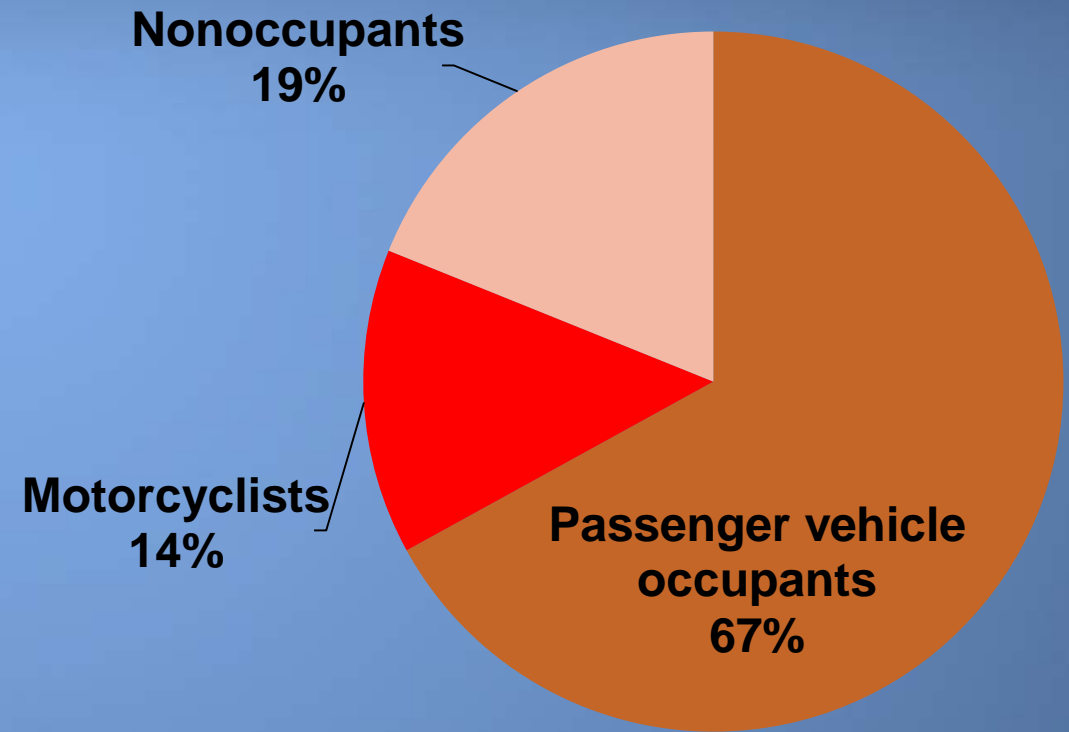
James H. Ritter

Director, Office of Research and Engineering

Roadway Activity and Traffic Fatalities, 2016



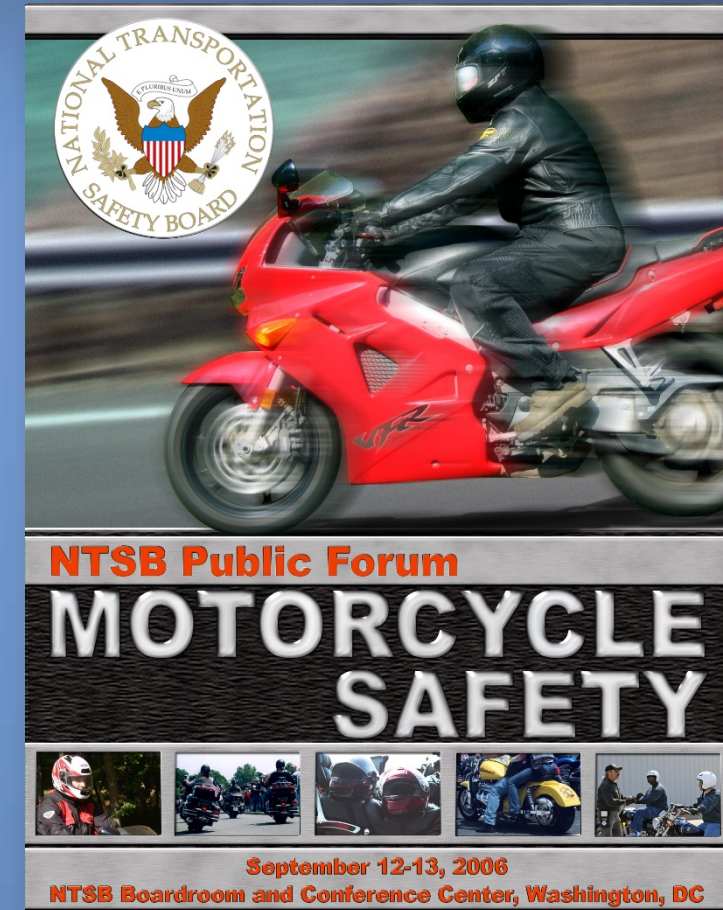
Roadway Activity in
Vehicle Miles Traveled



Traffic Fatalities

NTSB and Motorcycle Safety

- Motorcycle Safety Forum (2006)
- Safety Recommendations (H-07-34 through H-07-40)
- Most Wanted List



Motorcycle Crash Causation Study (MCCCS)

- Conducted by FHWA
- Orange County, CA, 2011-2015
- One or more reported injury sustained
- 351 crash cases, 702 non-crash-involved controls
- Most recent US crash causation data since 1981 Hurt Report

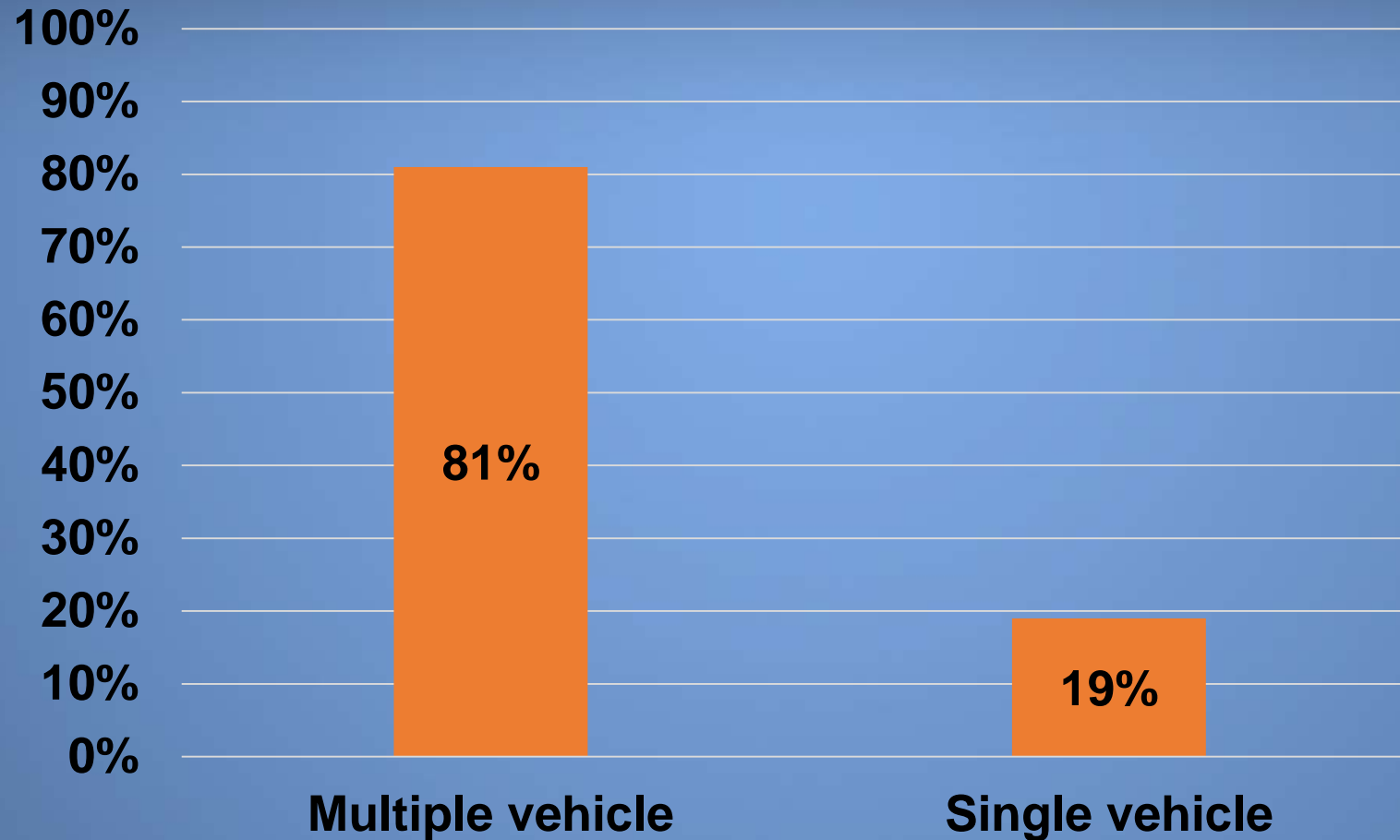


**Federal Highway
Administration**

Methods

- Detailed analysis of the *MCCS* data
- Analyzed crash and activity data from national and state sources
- Reviewed scientific literature to evaluate mitigation options for the crash risk factors identified in the *MCCS*

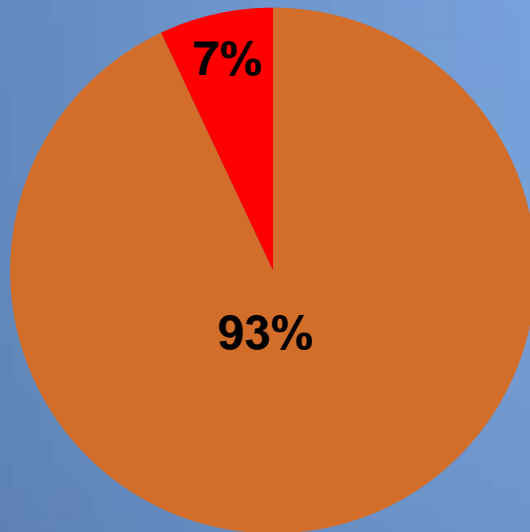
MCCS Crash Cases



MCCS Crash Severity

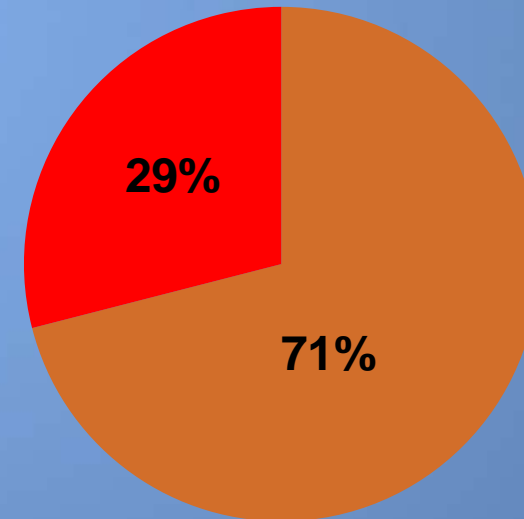
Multiple vehicle

■ Nonfatal crashes ■ Fatal crashes



Single vehicle

■ Nonfatal crashes ■ Fatal crashes



MCCS Crash Characteristics

- Arterial roads
- Urban settings
- Between 2 p.m. and 8 p.m.
- Typically at intersections
- Posted speed limit 45 mph or lower
- About 64% of multiple-vehicle crashes attributed to other vehicle drivers, not the motorcycle rider

Safety Issue Areas

- Crash warning and prevention
- Braking and stability
- Alcohol and other drug use
- Licensing procedures

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Technical Review

Federal Highway Administration

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Motorcycle Industry Council



National Transportation Safety Board



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Improving the Detection of Motorcycles by Crash Warning and Prevention Systems

Eric B. Emery, PhD

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Motor Vehicle-Based Technologies

- Right-of-way violations by other vehicle drivers were common in multiple-vehicle crashes
- Perception failures more common among other vehicle drivers than motorcycle riders
- Vehicle-based crash warning and prevention systems are not always designed to detect motorcycles

Connected Vehicles and Infrastructure

- Most riders had three seconds or less to avoid the crash
- Connected technologies extend the range of hazard detection
- Provide more time to react to crash risks
- Limited integration of motorcycles in these systems compared to other vehicle types



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Enhancing Motorcycle Collision Avoidance Performance and Control

Braking and Stability

- Riders attempted collision avoidance in about two-thirds of crashes analyzed
- Reduced stability on a two-wheeled motorcycle compared to four-wheeled vehicles
- Riders often chose the best collision avoidance maneuver for the situation
- Slide outs and running wide on curves were common loss-of-control scenarios

Antilock Braking System (ABS) Technology

- Helps the rider bring the motorcycle to a rapid, controlled stop
- Improves stopping performance of novice and experienced riders
- ABS on motorcycles has lagged compared to passenger vehicles

Stability Control Systems

- Improved braking performance of ABS, even while cornering
- Could reduce crashes in which a motorcycle runs off the road with no other vehicle involvement
- Run-off-road crashes were the most deadly scenario analyzed in the *MCCS*



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Addressing Rider-Related Factors and Risk Behaviors

Alcohol and Other Drug Use

- *MCCS* was often unable to collect alcohol or other drug use data for riders
- Alcohol and other drug use is well established as a risk factor in motor vehicle crashes
- Research needed to evaluate countermeasures to reduce substance-impaired motorcycle crashes

Licensing Procedures

- *MCCS* riders were three times as likely to be unlicensed compared to other motor vehicle drivers
- Widespread variation in motorcycle rider licensing procedures
- Limited independent research on the overall effectiveness of licensing procedures



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