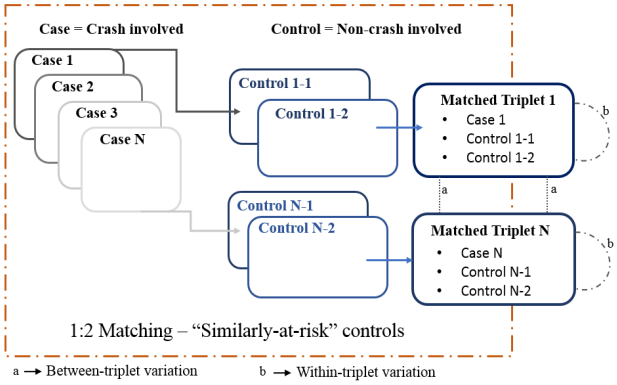
Collaborative Sciences Center for ROAD SAFETY

RESEARCH BRIEF

Investigating the Vulnerability of Motorcyclists to Crashes and Injury

Motorcyclists are fatally injured 25 to 30 times more frequently than passenger vehicle occupants after accounting for vehicle miles traveled. This project uses the Injury Severity Score (ISS) as a response variable and focuses on a unique database of motorcycle crashes, the federally collected Motorcycle Crash Causation Study (MCCS), to explore the role of demographics and how key risk factors vary from one context to another, i.e., the settings in which motorcycle travel takes place.

This study conducts a rigorous heterogeneity-based case-control analysis to account for both within and between matched case-control variations (see figure).



A Matched Case-Control Framework.

The project addresses critical safety issues related to motorcyclists:

- Motorcycle crash risk factors, especially how visual conspicuity (bright-colored or reflective clothing) influences their likelihood of being involved in a crash;
- How the frequency and causes of crashes among young and inexperienced riders differ from those of older, experienced riders;
- How training and education programs relate to crash outcomes; and
- New automation technologies.

The results show several key factors related to rider experience, alcohol/multiple drug use, apparel and head coverage had correlations with ISS. The study showed that if a rider's shoes were motorcycle-specific, ISS were lower. Given a crash, partial helmet coverage was positively correlated with higher ISS, which is intuitive as such helmets provide less coverage compared to full face helmets and thus pose a higher risk of injury. It was also found that such helmets were associated with lower crash risk.

One implication of this work is the need for helmets that have broader coverage, but that also allow the rider to hear and see well. In the future, researchers can simultaneously model the injury severity sustained by different body parts of the same rider to account for unobserved heterogeneity. Also, one may examine the occurrence and outcomes of motorcycle crashes once connected and automated vehicle technology diffuses through the system.

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