

HSIS STUDENT RESEARCH PAPER COMPETITION
EXCELLENCE IN HIGHWAY SAFETY DATA AWARD
FIRST PLACE

Fazalay Khoda Beshal
Rowan University

“Bus-Involved Crash Severity in Multi-State HSIS Data: A Comparative Statistical and Machine Learning Analysis with Cross-State Transferability Assessment”



ITE—A Community of Transportation Professionals is pleased to recognize **Fazalay Khoda Beshal**, a graduate student in civil and environmental engineering at Rowan University, as the first-place recipient of the [2026 HSIS Excellence in Highway Safety Data Award Student Research Paper Competition](#) for his paper, **“Bus-Involved Crash Severity in Multi-State HSIS Data: A Comparative Statistical and Machine Learning Analysis with Cross-State Transferability Assessment.”**

The Federal Highway Administration’s Highway Safety Information System (HSIS) Student Research Paper Competition encourages university students to use HSIS data to introduce future highway safety professionals to quality safety data, appropriate research methods, and the practice of using data to support transportation safety decisions.

Beshal’s first-place paper examines bus-involved crash severity using 31,395 crashes from Illinois and Minnesota HSIS data. The study links bus unit records with crash-level data and applies both an ordered logit model and a class-balanced Random Forest model to compare statistical and machine-learning approaches. It also evaluates whether crash severity models developed in one state can be reliably transferred to another.

The research identifies several factors that consistently increase crash severity, including pedestrian or bicyclist involvement, head-on collisions, multi-bus crashes, and dark-lighted conditions. It also finds that small buses, sideswipe crashes, and peak-hour crashes are associated with reduced severity. Importantly, both the statistical and machine-learning models produced similar rankings of severity drivers, strengthening confidence in the study’s findings.

A key contribution of the paper is its cross-state transferability assessment. Beshal's analysis found that although the order of major risk factors was similar across Illinois and Minnesota, the exact model coefficients did not transfer reliably between states. The study recommends that state departments of transportation and transit agencies re-estimate severity models locally before applying them to safety planning or corridor screening.

The paper's findings offer practical guidance for improving bus safety. Recommended countermeasures include prioritizing strategies that reduce bus-pedestrian conflicts in urban corridors, particularly during dark-lighted and dawn/dusk conditions, such as leading pedestrian intervals, stop daylighting, and on-bus pedestrian-detection systems. The study also calls for improved HSIS data harmonization to support stronger future bus safety research.

Beshal's research demonstrates the value of high-quality safety data, rigorous analysis, and careful interpretation in addressing complex transportation safety challenges. ITE congratulates Fazalay Khoda Beshal on this well-deserved recognition and celebrates his contribution to advancing highway safety research and data-driven decision-making.

You can read about Fazalay's research in an upcoming issue of *ITE Journal*. Learn more about [ITE's Awards Program](#).