

# Driver histories, charges, and convictions in bicycle- and pedestrianmotor vehicle crashes

### Cara J. Hamann<sup>\*</sup>, Brandon Butcher<sup>#</sup>, Corinne Peek-Asa<sup>†</sup>

\*University of Iowa Injury Prevention Research Center Department of Epidemiology University of Iowa College of Public Health 145 N. Riverside Dr., S449 CPHB, Iowa City, IA email: cara-hamann@uiowa.edu <sup>#</sup>Department of Biostatistics
University of Iowa College of Public Health
145 N. Riverside Dr., N300 CPHB, Iowa City, IA
email: brandon-butcher@uiowa.edu

<sup>†</sup>University of Iowa Injury Prevention Research Center Department of Occupational and Environmental Health University of Iowa College of Public Health 145 N. Riverside Dr., S143 CPHB, Iowa City, IA email: corinne-peek-asa@uiowa.edu

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#### **1 INTRODUCTION**

Bicyclist and pedestrian injuries are a large health burden in the United States, with over 677,000 injuries and 6,300 deaths annually [1]. The most severe crashes often involve motor vehicles colliding with the bicyclist or pedestrian. However, research has primarily focused on the bicyclist or roadway, rather than driver behaviors or characteristics.

This study had two main objectives: 1) examine charges, convictions, and driver characteristics in bicycle- and pedestrian- motor vehicle (BMV and PMV) crashes and 2) examine driver histories (prior traffic-related charges and convictions) among drivers involved in bicycle- and pedestrian-motor vehicle collisions. We hypothesized that drivers who hit a bicyclist or pedestrian would have more problematic driving histories, compared with the general driver population.

### 2 METHODS

A cross-sectional study of crash characteristics, charges, and convictions was conducted using police-reported bicycle- and pedestrian-motor vehicle crashes identified from the Iowa Department of Transportation (IDOT) crash database for the years 2011 to 2014. Individuals involved in the crash were linked to Iowa Department of Corrections (IDOC) courts data to identify which parties were cited in the crash and to describe the resulting charges (citations made after the crash) and convictions (charges for which the individual was found guilty). Charges and convictions were categorized into 11 types, based on their description: 1) drug/alcohol related, 2) administrative (e.g. suspended license), 3) failure-to-yield to pedestrian or vehicle, 4) failure to obey traffic sign/signal, 5) homicide/manslaughter/willful injury by vehicle, 6) failure to maintain control or unsafe passing, 7) leaving scene of accident, 8) reckless or speeding, 9) non-moving traffic violation, 10) traffic irrelevant, and 11) non-traffic related felony.

A case-control analysis was nested within the cohort of crashes identified in 2011 to study driver histories among drivers who hit pedestrians or bicyclists compared with a control group without such crashes. Drivers who hit

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bicyclists or pedestrians identified from the IDOT crash database for the year 2011 comprised the case group. Controls were randomly selected from the Iowa Licensure Database and matched to cases, 2:1, on age and gender. Driving histories were extracted from the IDOC courts database for the three years preceding each crash date.

### 2.1 Analysis

For the cross-sectional study, frequency distributions of charge and conviction types, crash characteristics, and driver, pedestrian, and bicyclist characteristics were examined. Logistic regression was used to examine predictors of a driver receiving a charge in a bicycle- or pedestrian-motor vehicle crash. A 30-day window following each crash date was used as the period for identifying crash-related charges and convictions were linked to these charges, based on a unique identification number that corresponded to each charge.

For the case-control analysis, a GEE model with negative binomial distribution was used to calculate the rate ratio of charges between the cases and controls. The correlation structure used for the GEE model accounted for the 2:1 matching design by considering the two controls and one case as in the same cluster.

### **3 RESULTS**

The cross-sectional portion of the study included 2568 bicycle-motor vehicle (BMV) and pedestrian-motor vehicle (PMV) crashes, which included 2568 drivers and 2593 bicyclists or pedestrians. The majority of drivers (1734, 67.5%) were not charged after they had hit a bicyclist or pedestrian, and charges varied significantly based on which party, the vehicle driver or bicyclist/pedestrian, was considered to be at fault (listed as contributors) in the crash. Only 2% of crashes listed the driver as the only party that contributed to the crash. The majority of crashes identified the bicyclist or pedestrian only (38.7%) or both driver and bicyclist or pedestrian (30.5%) at fault. When both the driver and the bicyclist or pedestrian were listed as having contributed to the crash, only 52% of drivers were charged, compared to 62% when only the driver contributed to the crash, and 9% when the bicyclist or pedestrian were the only ones with contributing causes reported. Among the 32.5% (N=834) of drivers who did receive a charge the included BMV and PMV crashes, there were a total of 1271 charges, of which 900 (70.8%) resulted in convictions.

The case-control portion of this study included 544 cases (drivers who hit a bicyclist or pedestrian) and 1088 controls (drivers from the general Iowa driver population). Cases had a significantly higher number of charges during the three years preceding the crash than controls (44.1% vs. 34.6%; p < 0.01). Drivers who hit a bicycle or pedestrian were 1.5 times (95% CI: 1.2 – 1.9) more likely to have had one or more previous charges than the control group.

### **4 CONCLUSIONS**

Drivers involved in BMV and PMV crashes infrequently receive charges and a third of those charges do not result in convictions, even when drivers are reported as having contributed to the crash cause. Drivers who have a history of traffic-related charges pose an increased danger to bicyclists and pedestrians, compared to the general driver population. Potential avenues for prevention of bicycle- and pedestrian-motor vehicle collisions include targeted law enforcement activities and training (e.g., increased enforcement in the most problematic locations or time periods and continuing education on BMV and PMV crash reporting procedures) and increased driver punishments (e.g., strengthened traffic law, increased insurance premiums).

### REFERENCES

[1] Centers for Disease Control and Prevention. Data and Statistics (WISQARS). 2015. Available at: https://www.cdc.gov/injury/wisqars/index.html. Accessed February 27, 2017.