Michigan's Motorcycle Helmet Law Repeal: Using Data to Illustrate Its Effect

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Abstract

Using Michigan crash data made available through Michigan Traffic Crash Facts, motorcycle data were analyzed to determine the effect of the motorcycle helmet law modification that went into effect on April 13, 2012. Starting on that date, riders over 21 are no longer required to wear a helmet while riding a motorcycle. A combination of exploratory analyses and logistic regression were used to analyze data for motorcycle riders involved in Michigan crashes before and after the modification. Helmet use has decreased by 22% since the change, but an association between helmet non-use and alcohol use make direct assessment of risk challenging. A regression model used to separate the effects of alcohol and helmet use shows that approximately 26 fatalities are attributable to reduced helmet use after the modification of the law.

Objectives

The goal of this analysis is to assess the consequences of the modification to the Michigan motorcycle helmet law. The key areas of interest include: potential increase in out-of-state riders in the crash population (due to increased motorcycle tourism); potential increase in fatalities because of helmet non-use; and the ability of the data to address these questions.

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Data available at: michigantrafficcrashfacts.org

Photo courtesy of Jon Benallack, OHSP

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Methods

Data from police-reported crashes involving one or more motorcycles were used for this study. To account for exposure differences for the time of year after the motorcycle helmet law was modified, we focused primarily on crashes occurring between April 13 and December 31 each year from 2008 through 2012. The cutoff point of December 31 was selected because Michigan crash data is frozen at this point. Determination of helmet use or non-use was based on the police reports.

Trends in motorcycle fatal and non-fatal crashes by day, month, week, and county were compared across years to investigate whether there was any reporting bias that might have resulted from the helmet law change. Although total crashes were somewhat higher in 2012, no substantial differences in the pattern of motorcycle injuries or crashes by day of the week, month, or county were observed.

To estimate the number of fatalities and serious injuries that would have been prevented if helmets had been worn, two logistic regression models were fitted. One predicted risk of fatality and the other predicted risk of serious injury as a function of predictors such as rider age and gender, alcohol involvement, and helmet use. The fitted models were then applied to each case in the dataset. For each case, risk of fatality and serious injury were estimated with and without a helmet. All other variables remained the same, based on the specific case details (e.g., age, gender, alcohol). The difference in average risk for the two cases, multiplied by the total number of crashes, represents the number of fatalities and serious injuries attributed to helmet non-use.

Key Facts

- Michigan's motorcycle helmet law was modified as of April 13, 2012 so that riders age 21 and up are no longer required to wear a helmet
- Helmet use dropped from 98% to 74% after the modification (among crash-involved riders)
- Helmet used dropped from 90% to 54% among drinking riders after the modification
- Regression models indicate that when other factors (e.g., alcohol use) are accounted for, fatality risk is doubled by not wearing a helmet
- Models also indicate that serious injury risk increases by 60% for those who do not wear helmets
- Helmet non-use in 2012 is estimated to have led to 26 additional fatalities and 49 additional serious injuries

Results

Table 1.

Michigan Motorcycle Crashes	
Year	Total Crashes
2008	3,969
2009	3,338
2010	3,285
2011	3,104
2012	3,510

Table 2.

Time Period	Year(s)	Helmet Rate
January 1 – April 12	2008-2011	96.6%
	2012	96.2%
April 13 – December 31	2008-2011	97.6%
	2012	74.1%

Figure 1.

Michigan Motorcycle Fatalities by Helmet Use
April 13 – December 31
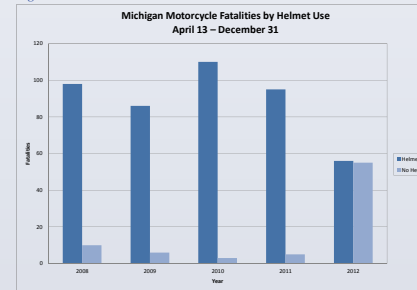
Table 3.

Time Period	Helmet Use	Fatalities	Serious Injuries	Percent Fatal	Percent Serious Injury
April 13 – Dec. 31 2011	Yes	95	493	3.2%	16.5%
	No	5	21	7.2%	30.4%
April 13 – Dec. 31 2012	Yes	56	390	2.3%	16.0%
	No	55	194	6.5%	22.8%

Table 4.

Driver Status	Year(s)	Helmet Use Rate
Driver Not Drinking	2008-11	98.2%
	2012	75.7%
Driver Drinking	2008-11	90.4%
	2012	53.6%

Conclusions

Table 1 shows the total number of crashes for each calendar year. This crash count increased from 3,104 in 2011 to 3,510 in 2012, though favorable weather in 2012 probably led to an increase in ridership and a corresponding increase in total crashes. In the crash population, helmet use went from 97.6% from 2008-2011 to 74.1% in 2012 after modification of the helmet law (Table 2). Figure 1 shows the distribution of helmet use among fatally-injured riders over the five-year period. Comparing the even split between helmet users and helmet non-users in 2012 to the 75% overall helmet use rate in crashes gives some indication of the greater risk of fatality to helmet non-users.

From 2011 to 2012, the percentage of out-of-state riders who were involved in Michigan crashes increased slightly from 7.6% to 8.3%. Out-of-state riders wear helmets at a slightly lower rate than in-state riders. In 2012, 28.7% of out-of-state riders involved in crashes did not wear helmets, compared to 25.8% of in-state riders. Females in motorcycle crashes are 4.4% more likely than males to wear a helmet.

Table 3 displays the percent of fatalities and serious injuries among motorcyclists in crashes. For motorcycle riders who are not wearing a helmet, risk of fatality is 2.8 times higher and risk of serious injury is 1.4 times higher than for those who do wear a helmet. However, as shown in Table 4, the helmet use rate for drivers who are drinking decreased from 90.4% to 53.6% after the modification. Motorcyclists with an alcohol-impaired driver are 22.1% less likely to wear a helmet based on 2012 crash data. Alcohol more than quadruples the risk of death and nearly triples the risk of serious injury. Thus, fatality and injury rates for helmet non-users is affected by a combination of increased risk due to helmet non-use and increased risk due to association with alcohol.

In order to separate the effects of helmet non-use and alcohol use, separate logistic regression models were developed to predict risk of serious injury and fatality as a function of a variety of predictors. After accounting for other risk factors, which included speed limit and alcohol involvement (driver age and gender were not significant), not wearing a helmet doubles the risk of fatality and increases the risk of serious injury by 60%. Applying these models to the 2012 data, we estimate that if all riders had worn helmets we would expect approximately 26 fewer deaths and 49 fewer serious injuries. With future years of data, we will be able to further explore this issue and establish more conclusive results.