



## Examination of factors determining fault in two-vehicle motorcycle crashes

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### ARTICLE INFO

#### Article history:

Received 25 March 2011

Received in revised form 19 August 2011

Accepted 22 September 2011

#### Keywords:

Fault

At-fault

Multivariate probit

Motorcyclist safety

Motorcycle crash

### ABSTRACT

Motorcycle crashes frequently involve a combination of high-risk behaviors by the motorcyclist or the other crash-involved driver. Such behaviors may include riding or driving without appropriate licensure or while under the influence of alcohol, as well as deciding not to use a safety device such as a helmet or safety belt. Given that these factors frequently occur in combination with one another, it is difficult to untangle the specific effects of individual factors leading up to the crash outcome. This study assesses how various rider-, driver-, and other crash-specific factors contribute to at-fault status in two-vehicle motorcycle crashes, as well as how these same factors affect the propensity for other high-risk behaviors. Furthermore, the interrelationships among fault status and these other behaviors are also examined using a multivariate probit model. This model is developed using police-reported crash data for the years 2006–2010 from the State of Ohio. The results show that younger motorcyclists are more likely to be at-fault in the event of a collision, as are riders who are under the influence of alcohol, riding without insurance, or not wearing a helmet. Similarly, motorcyclists were less likely to be at-fault when the other driver was of younger age or was driving under the influence of alcohol, without insurance, or not wearing their safety belt. Crash-involved parties who engaged in one high-risk behavior were more likely to engage in other such behaviors, as well, and this finding was consistent for both motorcyclists and drivers. The results of this study suggest that educational and enforcement strategies aimed at addressing any one of these behaviors are likely to have tangential impacts on the other behaviors, as well.

Published by Elsevier Ltd.

### 1. Introduction

The annual number of motorcyclist fatalities in the United States has increased dramatically from 3365 in 2002 to 5409 in 2008. In 2009, this was followed by the first annual reduction since 1996 as fatalities decreased to 4595 (NHTSA, 2010). Preliminary statistics indicate that motorcyclist fatalities decreased again, by approximately 2 percent, in 2010 (Hedlund, 2011). However, fatalities began increasing late in the year as detailed in a report to the Governors Highway Safety Association, which states “To prevent an increase in motorcyclist fatalities in 2011, states should work to increase helmet use, provide motorcycle operator training to all who need or seek it, and reduce motorcyclist alcohol impairment and speeding”. Recent crash statistics from the State of Ohio have

largely mirrored the national trend with 144 fatal injuries in 2002, increasing to 212 in 2008, and then decreasing to 163 in 2009 (Ohio Department of Public Safety, 2009). As motorcyclist fatalities continue to be among the areas of greatest concern to the motorcycle safety community, recent efforts have focused on lowering both the frequency and severity of motorcycle-involved crashes. These efforts have included numerous research studies conducted both in the United States and abroad.

There are several common areas that have emerged as prevailing themes within motorcycle safety research. This research has included studies examining the rate of helmet use (Li et al., 2008; Hung et al., 2008; Gkritza, 2009; Donate-López et al., 2010) and the impacts of legislation on helmet use (Branas and Knudson, 2001; Ichikawa et al., 2003; Coben et al., 2007; Houston, 2007; Houston and Richardson, 2008; Mayrose, 2008; Hill et al., 2009; Ranney et al., 2010), as well as the impacts of wearing a helmet on crash-related injuries and fatalities (Keng, 2005; Nakahara et al., 2005; DeMarco et al., 2010). Other studies have involved investigations of the effects of specific aspects of roadway design (e.g., intersections, horizontal and vertical curvature) on the frequency of motorcycle crashes (Quddus et al., 2001; Haque et al., 2010; Schneider et al., 2010). Various studies have also assessed those factors that influence the degree of injury sustained by crash-involved

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