Overcoming methodological issues in a systems approach to the analysis of motorcycle crash data.

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Abstract

Motorcyclists represent an increasing proportion of road casualties however, while the risk factors associated with crashes can be established, less is known about the precipitating factors that directly result in a crash. Analysis of crash data based on crash type and key vehicle identifies distinct differences in the patterns of error by riders in single-vehicle motorcycle crashes, and by riders compared to drivers in multi-vehicle crashes. These patterns also vary by rider age group and provide potentially valuable information that may be obscured when the data is aggregated. Crash risk rates are also calculated using registration data as a proxy for the active riding population. This is proposed as an alternative framework for the analysis of motorcycle crashes to inform a systems approach to targeted countermeasures.

Background

A uniform set of police crash data is the primary resource for road safety policy analysis. The data includes a wide range of variables which are of varying relevance according to vehicle types. Crash type (single/multi-vehicle) and key vehicle (rider/other driver) are of particular relevance to motorcycle crashes, in addition to factors such as road alignment and road surface conditions. Motorcycles have higher proportions of single vehicle crashes and are less likely to be the key vehicle in multi-vehicle crashes (Allen et al 2017). Such variations reflect differences in the patterns of error by riders compared to drivers providing potentially valuable information for motorcycle safety measures (Geedipally *et al* 2010, de Rome *et al* 2011). This paper describes a framework for the analysis of motorcycle crash data as a means of improving the identification of precipitating factors, which may be obscured when data is aggregated.

Method

The methodology classifies motorcycle crashes into three classes combining crash type single vehicle/multi-vehicle crashes (SVC/MVC) and key vehicle rider/other driver (R/O) as defined in road user movement (RUM) codes (Devlin et al 2011). The key vehicle is defined as having the major role in the crash which, although not necessarily legally at fault, may reveal systemic patterns of error. The three crash classes were applied as a framework for the analysis of other known human and environmental contributing factors. The methodology uses registered motorcycles as a proxy for the population of active riders to estimating crash risk rates.(de Rome *et al* 2016)

Results

The results identified different crash types and patterns of error associated with each of the three crash classes and rider age group. Overall, SVCs accounted for 39% and MVCs for 61% where the key vehicle was 22% rider and 39% other driver. Riders were the key vehicle in rear-end (54%) and head-on (66%) collisions. Single vehicle crashes occurred equally on straight as on curved sections of road. The other driver was the key vehicle in 62% of all multi-vehicle crashes, including intersection crashes (76%), lane changes/turning (73%), and maneuvering(85%). Younger riders' crashes (17-25) involved more MVCs (64%) compared to 55% for older riders (40+). Young riders were more likely than older riders to be the key vehicle in MVCs (42% vs 37%).

Conclusions

The application of the three crash classes together with key vehicle data provided valuable information about patterns of error to inform rider and driver education programs. It also provides insights into the environmental features that increase road user errors with implications for infrastructure design.

References

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