Monitoring and Improving Driving Behaviour of Motorcyclists Through an Innovative Smartphone Application

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ABSTRACT

Motorcyclists constitute a vulnerable road user group with up to 30 times higher fatality rates compared to passenger cars. Accurate monitoring of motorcyclist driving behaviour has been proven a challenge in the past due to the complexity of the issue. However, technological advancements in data recording systems, especially in telematics and Big Data analytics, along with the widespread use of smartphones, provide emerging new opportunities and features to monitor and assess real driving behaviour of motorcyclists.

In that context, the objective of the present study is to: (i) explore the speeding and aggressive behaviour of motorcyclists based on detailed driving analytics collected by smartphone sensors, and (ii) investigate whether personalized feedback can improve driving behaviour. This is achieved through a naturalistic driving experiment based on a smartphone application developed in the framework of the BeSmart project. More specifically, by collecting data from 20 motorcyclists are analysed in this study in order to examine the way that driving metrics such as harsh event frequencies (braking, acceleration, cornering) and speeding while driving are influenced by underlying risk factors.

Generalized Linear Mixed-Effects Models are fitted to the trips of motorcyclists who made frequent trips in order to model the frequencies of harsh events as well as speeding behaviour. A model for all trips was developed, as well as models for trips on different road types (urban, rural, highway). The findings suggest that speeding and aggressive driving behaviour are correlated both to exposure and behavioural driving indicators. Additionally, results capture and quantify the positive effects of awarding safe driving, thus providing needed impetus for larger-scale applications as well as relevant policy interventions.

Keywords: road safety, motorcyclists, driver monitoring, naturalistic experiment, smartphone application, Generalized Linear Mixed-Effects Models