Association of Expressed Driving Anger with Driving Performance
Combining Simulator and Survey Data

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Overview

Driving anger has a serious impact on road safety causing loss of concentration and loss of vehicle control.

The objective of the present research is to investigate the effect of anger on driver behaviour and safety focusing on certain characteristics of the driver and driving performance parameters.

Research focused on to what extent driving anger, depending on certain characteristics of the driver (e.g. driving experience, age, sex, etc.), contributes to certain driving patterns and the probability of an accident.

Background

Driving anger

is defined as the aggressive or angry behaviour of a driver
includes rude gestures, verbal insults and deliberately dangerous or threatening driving
can lead to quarrels, attacks and conflicts that cause injuries or even fatalities

Driving Anger Expression Inventory

is a widely used, valid and representative tool for measuring the expression of driving anger

Methodology

Sample

The sample of participants is 125 drivers
30 young drivers aged 18-34 years old
38 middle aged drivers aged 35-54 years old
57 older driver aged 55-80 years old

Driving experiment

Road environment:

A rural route that is 2.1 km long, single carriageway and the lane width is 3m, with zero gradient and mild horizontal curves

Traffic scenarios:

Moderate traffic conditions, corresponding to an average traffic volume Q=300 vehicles/hour

Unexpected events:

2 unexpected incidents occurred at fixed points of the route

Driving behaviour questionnaire

Driving experience - car use
Self - assessment of the older driver
Distraction-related driving habits
Emotions and behaviour of the driver Anger expression inventory during driving
History of accidents, near misses, and traffic violations

Factor analysis

A factor analysis was performed in order to reduce the number of independent variables related to anger.

The 4 factors identified as the optimal solution are the following:

1. External anger
2. Forgiveness
3. Internal anger
4. Noble-mindedness

Regression analysis

The multiple linear regression method was chosen for continuous variables.

The method used for the discrete variables was generalized ordinal logistic regression

\[
\text{Speed} > \text{Limit} = \frac{1}{1 + e^{1.3 - (0.5 \times \text{Forgiveness})}}
\]

\[
\text{Accidents} > 0 = \frac{1}{1 + e^{-1.68 - (0.84 \times \text{Forgiveness})}}
\]

\[
\text{Ticket} > 0 = \frac{1}{1 + e^{0.59 - (0.74 \times \text{Forgiveness}) - 0.49 \times \text{(Noble-mindedness)}}}
\]

Conclusions

Driving anger is a multidimensional phenomenon which means that no single driving performance measure/experimental methodology can capture all effects of anger.

The influence of driving anger on the average speed, the probability of violating the speed limit and the number of road traffic violations were confirmed.

The association of anger with driver characteristics (age and gender) was quantified.

Examination of drivers’ reactions the moment they appear to be in anger are essential for a deeper understanding of the mechanism of anger in driving.

Investigation of intervention strategies to eliminate the adverse effects of anger while driving.