Speeding and restraint use in crashes: fresh insights from event data recorders (EDRs)

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Abstract

Event data recorders (EDRs) are installed in many modern vehicles and, in the event of a crash, record driving data such as travel/impact speed, Delta-V and restraint usage. EDR data was collected from 312 crashed vehicles in South Australia during 2017 and 2018, and 238 of these could be matched to police reports. An analysis on speeding and seatbelt usage showed that 27% of free-speed vehicles were speeding and indicated that seatbelt wearing rates in crashes is close to 97%. EDR data provides a more accurate indication of levels of speeding in crashes than available from police reports alone.

Background and Aim

Speed is known to be a key factor in the incidence and severity of crashes (Kloeden, McLean, Moore & Ponte, 1997; Elvik, 2013) but traditional reconstruction methods to calculate vehicle speed in a crash are resource intensive and vary in reliability, therefore, imposing limitations.

Increasingly, modern vehicles are being equipped with event data recorders (EDRs) that document crash and pre-crash driving data including travel speed and seat-belt usage.

The aim of this study is to gain fresh insights into speeding rates and seatbelt use in crashes using EDR data.

Method

EDR data from crash-involved vehicles were collected during 2017 and 2018, matching the vehicles to police crash reports where possible to provide crash details. The vehicle data included in this study was obtained from crashed vehicles held at Pickles Auctions Pty Ltd (an organisation that auctions crashed vehicles). EDR data from fatal crashes obtained from the SAPOL Major Crash Investigation Section (MCIS) were also included in the study but were analysed separately due to the different sampling techniques. Further details on the data collection can be found in Doecke (2018).

Speeding was assessed for vehicles that were defined as free-speed vehicles if they met the following criteria.

- had right of way and was travelling through the intersection,
- was the striking vehicle in a rear-end crash,
- was either vehicle involved in a head-on crash,
- was a single vehicle crash, except on a sharp bend,
- was not making a significant manoeuvre or negotiating a roundabout.

Seatbelt use was assessed for any vehicle whose EDR recorded seatbelt use.

Results

A total of 312 EDR downloads were obtained, with 238 matched to a police report; 224 from Pickles, and 14 from MCIS.

Comparing data on all police reported crashes in South Australia in 2017 (Complete 2018 data was not yet available) from the Traffic Accident Reporting System (TARS), the EDR sample from Pickles was found to be representative in terms of injury severity, and broadly representative of speed zones, although 100 km/h zones were under-represented, which suggests an under-representation of rural crashes.

Figure 1 shows an example of an EDR readout and the locations of the crashes. The majority occurred in suburban Adelaide, but several occurred in the far corners of the South Australia.

Pre-Crash Data, -5 to 0 seconds (Most Recent Frontal/Rear Event, TRG 1)

Time (sec)	-4.9	-3.9	-2.9	-1.9	-0.9	0 (TRG)
Vehicle Speed (MPH [km/h])	53.4 [86]	53.4 [86]	51 [82]	42.3 [68]	26.1 [42]	11.2 [18]
Brake Switch	OFF	OFF	ON	ON	ON	ON
Accelerator Rate	Middle	OFF	OFF	OFF	OFF	OFF
Engine RPM (RPM)	1,600	2,000	1,200	1,200	800	400
Pre-Crash Data Status *	OFF	OFF	OFF	OFF	OFF	OFF

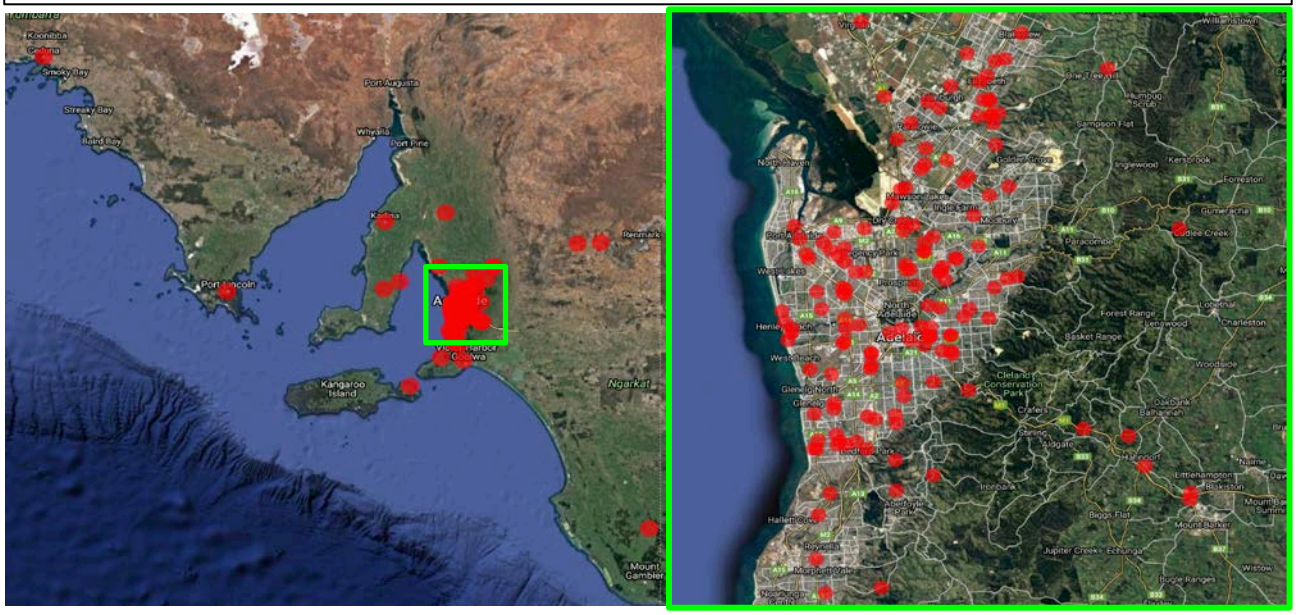

Figure 1. Example of EDR data obtained and locations of crashes for EDR vehicles downloaded at Pickles in South Australia and Adelaide suburban areas.

Due to the evolution of the EDR, each vehicle model and build year displayed varying data. Of the 224 matched cases from Pickles, 187 (83%) contained travel/impact speeds, 115 (51%) contained driver restraint usage data, and 58 (26%) contained front passenger restraint usage data. Of the 187 vehicles with a known travel speed, 126 were classified as free-speed vehicles, while 11 of the cases from MCIS were classified as being from a free-speed vehicle.

The number of free-speed vehicles speeding from the different EDR data sources are shown in Table 1, along with the number of crashes where police reported the main error as being excessive speed in TARS.

Table 1. Excessive speed as a crash error in TARS and free-speed vehicles speeding in EDR data.

Speeding	**TARS 2017 data**		**Free-speed vehicles from Pickles**		**Free-speed vehicles from MCIS**	
	Number	*Percentage*	*Number*	*Percentage*	*Number*	*Percentage*
Not Speeding	13238	100.0%	92	73.0%	6	54.5%
Speeding	0	0.0%	34	27.0%	5	45.5%
Speeding by 5 km/h+	-	-	24	19.0%	4	36.4%
Speeding by 10 km/h+	-	-	17	13.5%	4	36.4%
Total	13238	100.0%	126	100.0%	11	100%

EDR data from the Pickles' cases exposed three vehicle drivers (3%) being unrestrained, while no passengers were recorded unrestrained. EDR data from the MCIS cases showed two drivers (7%) were unrestrained, both resulting in fatalities.

Limitations

The sample size of the EDR data is small and so the result for percentage speeding is only considered preliminary. Rural cases may have been under-represented, and speeding is more prevalent on rural roads (Kloeden & Woolley, 2017); therefore, the percentage found to be speeding could be an under-estimate.

Conclusions

EDR data can provide objective data on speeding and seatbelt use and provides a more accurate indication of levels of speeding in crashes than available from police reports alone. Speeding in crashes was found to be common (27%), especially in the serious crashes investigated by MCIS (46%). Non-use of seatbelts in crashes was found to be a small number in all crashes (3%), but a concern (7%) in fatality crashes.

References

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