

Road Safety Policy & Practice

Telematics and Vehicle Safety

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Key Findings

- Pay-how-you-drive (PHYD) technology is available and is easily retro-fitted to vehicles
- The system typically monitors speed, deceleration, acceleration and cornering
- Drivers receive insurance premium discounts for complying with speed limits and minimising high acceleration/ deceleration events
- Substantial reductions in crashes are being reported

Abstract

Recent developments in telematics technology provide the opportunity to improve driver behaviour by rewarding good driving. Vehicle insurance companies in Europe and North America have successfully introduced pay-how-you-drive (PHYD) insurance policies where the driver agrees to have a telematics device installed in their vehicle in return for substantial reductions in insurance premiums. This paper describes recent developments with in-vehicle telematics, including incentives to encourage drivers to reduce risky driving behaviour. The potential road safety benefits are examined and some implementation issues are addressed. In-vehicle telematics is considered to be a promising vehicle safety technology, which can be easily retrofitted to existing vehicles.

Keywords

Telematics, driver behaviour, insurance, speeding

Introduction

In-vehicle recording of vehicle parameters such as location and speed, and transmitting this information to a remote monitoring system have been in use for decades. It is an essential component of Intelligent Transport Systems (ITS). This has mainly been used for commercial vehicle operations such as logistics, efficiency monitoring and incident tracking.

In recent years the data collected have been enhanced to include longitudinal acceleration (acceleration and braking) and lateral acceleration (cornering). Improvements to global positioning systems (GPS) have also brought greater accuracy in measuring vehicle speed (better than 1km/h accuracy). Digital mapping of roads has provided information on posted speed limits including differentiation of time activated speed zones (e.g. school zones). For example, in 2016 Transport NSW released the free “Speed Advisor” app for smartphones, giving drivers speed limit assistance throughout New South Wales (TNSW, 2016). In Europe mapping of speed limits is well-advanced, due partly to safety ratings by Euro NCAP which reward vehicles with speed limit advisory systems (Global NCAP, 2017).

Furthermore, data can now be readily transmitted through the mobile phone network in real time.

With these developments it is now possible to detect and record the following events, which might be associated with risk-taking:

- Excessive heavy braking events (distracted driver, inappropriate speed, following too closely, aggressive driving)
- Excessive high acceleration events (aggressive driving)
- Excessive cornering forces (inappropriate speed, aggressive driving)
- Time-of-day and geographic location (driving at high-risk times and/or locations)
- Exceeding the speed limit (inappropriate or dangerous speed, distracted, fatigued or inattentive driver)

There are various ways in which telematics can be applied to improve road safety. The initial use has mainly been for

vehicle fleets, with one UK fleet (Andrew Page: <http://www.andrewwpage.com>) reporting a 97% reduction in speeding and a 47% reduction in crashes (ETSC, 2016; Masternaut, 2016). That fleet also reported reduced maintenance costs and improved fuel economy. Some systems in the USA are promoted to parents as a way of monitoring teenage drivers.

Pay-How-You-Drive Insurance

Car insurance companies are continually trying to improve their assessment of customer risk so that premiums can better match the likelihood of an insurance claim. A promising new use of telematics is by car insurance companies that wish to give incentives for less risky driving, particularly by young drivers. In recent years several telematics trials have been conducted. Initially these looked at distance travelled and other simple parameters. More recently the availability of advanced telematics means that the manner in which a person drives can be recorded and analysed. One successful trial by the University of Sydney reported the following (Greaves and Fifer, 2011):

“Pay-How-You-Drive (PHYD) products are being increasingly offered through the commercial insurance sector. While undoubted challenges remain, GPS technology opens up the possibility for developing greater equity in charging systems that reflect not just the kilometres driven but when, where and how they are driven...it has been demonstrated that it appears possible to significantly change aggregate behaviours (particularly speeding) of a segment of the motoring public through financial leverages based on incentivising positive changes in driving behaviour.”

That project used an on-board recording system that included a digital map of Metropolitan Sydney speed limits and a GPS to determine vehicle position, speed and direction of travel. The system recorded incidents where the speed limit was exceeded. The driving characteristics of participants were recorded before they were told about the purpose of the trial in order to set a baseline of driver behaviour for the purposes of comparison. Participants were then offered moderate financial incentives to reduce the kilometres driven, reduce night-time driving and reduce episodes of exceeding the speed limit. As indicated above, the outcomes in reducing targeted areas of ‘risky’ behaviour were positive, particularly with regards to speeding.

Examples of PHYD insurance

In recent years several European car insurance companies have introduced PHYD insurance, and Australian car insurance companies have made similar initiatives. Some of these examples are described below. Note that inclusion here does not imply endorsement of these commercial products.

Ingenie

The UK insurance firm Ingenie (<http://www.ingenie.com>) offers PHYD insurance, mainly for young drivers. Ingenie won the 2013 Prince Michael Awards for Road Safety for Young Drivers (RoadSafe, 2013).

The steps described in the promotional material are:

1. An Ingenie telematics box is fitted out of sight in the car, collecting data on how the car is driven;
2. Data are transmitted from the box to secure servers via the EE network, allowing us to access your driving style;
3. We send you feedback on your driving which is available via the Ingenie app or online;
4. We give discounts to our best and most improved drivers, so drive well and you could pay less.

The website states: “We assess how you drive in 4 key areas: speed, braking, acceleration and cornering. On average our customers save over £500 when they insure with us.” The Ingenie smartphone app gives the driver a driving score for the month and an indication of the premium discount (“Well done! You’re on track for a £62 discount at your next price review.”). The app also gives feedback on the assessed parameters (“Speed - Good. You’re keeping to the speed limits - Ingenie rewards good driving. Keep it up!”).

Insure-the-box

Insure-the-box (<https://www.insurethebox.com/>) is a UK insurance product that is similar to Ingenie. The website promotes an Accident Alert feature described as follows:

“The in-tele-box fitted to your car can sense a strong impact on the car. When this happens, an alarm is activated in our Service Centre. If your car is stationary, we will try to call you to check you are OK and try to help you get going. If your car is moving we will assume you do not require urgent assistance. If we can’t get in contact and your car is not moving we will assess all the circumstances relating to the incident. If appropriate, we will attempt to contact the emergency services.”

QBE Insurance Box for Young Drivers

The Australian insurer QBE recently introduced Insurance Box PHYD insurance (<https://www.qbe.com.au/insurance-box>) described as follows:

“When you take out a policy we’ll send you an Insurance Box, a small device that plugs in under your dashboard. It transmits data such as speed, distance travelled and heavy braking. This helps us understand what kind of driver you are and your likelihood of having a collision. We then price your insurance based on the data.”

According to QBE, they are the only Australian vehicle insurer currently offering PHYD insurance, although several have “pay-as-you-drive” policies that are based on vehicle odometer readings (distance travelled) but do not monitor the way in which the vehicle is driven.

NRMA Connected-Car

The motorist organisation NRMA in New South Wales recently introduced a telematics tracking system called Connected-Car (NRMA, 2017). It is targeted at commercial fleets and helps to monitor vehicle usage. It can produce driver score reports to encourage safer more efficient driving and has a smartphone app. It can also provide accident alerts.

At this stage the system does not appear to be used for the purpose of PHYD insurance but it is evident that the system has the same functionality as successful PHYD schemes.

Potential road safety benefits

There are numerous ways in which telematics can result in a reduction in road trauma. The following three areas are considered to have the highest potential benefits, when compared with other countermeasures.

Speeding

PHYD insurance is generally set to discourage speeding by several km/h over the speed limit. There is widespread misunderstanding of the proportion of road trauma associated with “low range” speeding (Paine, 2009; Doecke, 2011; ETSC, 2017).

In 2012, Prof. Holman from the School of Population Health, University of Western Australia, conducted research for the Road Safety Council of Western Australia (Holman, 2012). It was concluded that “52% of total killed and seriously injured (KSI) in [Perth] metropolitan 60km/h zones are attributable to illegal speeding”. Furthermore, he analysed the contribution from each speeding range. In brief, it was estimated that about 15% of KSI would have been avoided if vehicles travelling between 1km/h and 10km/h over the speed limit had not been speeding. Four percent of preventable KSI were estimated to be in the range of 1km/h and 5 km/h over the speed limit. This is a range where most drivers feel they are driving safely and will not get fined for speeding. However, based on Holman’s estimates, more than 800 KSI would be prevented each year across Australia if this group were not speeding.

Holman further found that the sensitivity to speeding is not as high in rural areas but low-range speeding (1km/h-10 km/h over the speed limit) still accounted for one third of speeding-related crashes, or 7% of all KSI on rural roads in Western Australia.

Traditional speed enforcement is not particularly effective for low-range speeding and PHYD insurance (or another telematics solution) may be particularly effective for discouraging low range speeding (Paine, 2013).

Forward collision avoidance

PHYD insurance may also discourage other risk taking such as following too closely and inattention. Crashes involving these behaviours are typically those for which forward collision avoidance technology can be expected to be

effective. A 2012 study by the Centre for Automotive Safety Research (Anderson, 2012) concluded that “between 20 and 40 per cent of all fatal crashes and between 30 and 50 per cent of all injury crashes might be prevented with forward collision avoidance technology (FCAT) systems.”

Crash alerts

As described above, the telematics used for PHYD insurance also has the capability to be used for crash alerts (“maydays”), where the monitoring organisation/insurer might call emergency services if a vehicle is involved in a high-severity crash in a rural area and there is no response from the driver to a mobile phone call. Prompt emergency services response to a road crash in unpopulated areas is known to reduce the risk of a fatality. For example, it has been estimated that an effective mayday system could reduce vehicle occupant fatalities by 5 to 10% in Finland (ITF, 2016).

Discussion

The effectiveness of telematics-based PHYD insurance on each of the above scenarios (speeding, forward collision avoidance and mayday assistance) is uncertain at this stage. The individual savings from the three scenarios are not cumulative and so the combined effect is unknown. As mentioned above, the Andrew Page fleet in the UK reported a 47% reduction in crashes after introducing telematics. In effect, this is similar to insurance company statements that PHYD insurance typically halves customer’s premiums, since premiums are partly based on crash risk. It is therefore considered that 50% reduction in crashes is feasible through effective PHYD insurance.

PHYD telematics systems can be retrofitted to any vehicle and so can be introduced swiftly, without needing to wait for new vehicles (with desirable safety features) to replace older vehicles. The integration of smart phones with vehicle technology is expected to further enhance the introduction of PHYD insurance.

At this time, most Australian vehicle insurers appear to be reluctant to offer PHYD insurance despite the success of these systems demonstrated in the UK and USA. Since each Australian state usually has an over-seeing organisation for third-party injury insurance it might be worthwhile for these organisations to encourage PHYD insurance.

In the USA, according to the National Association of Insurance Commissioners, it is expected that 70% of vehicle insurers will use telematics by 2020 (NAIC 2017). Telematics-based insurance is already available in 42 US states, although not all safety-related risks such as speeding are currently covered.

It is anticipated that there may be a vocal group that opposes a “big brother” approach and denies that low-range speeding is a road safety problem. Under voluntary PHYD insurance schemes, people may miss out on the possible large insurance premium discounts that apply to those who are prepared to demonstrate that they are a low insurance

risk. Greaves (2011) points out that eventually insurers will need to raise the premiums for drivers who do not elect to have PHYD insurance because, in many cases, less risky drivers are effectively subsidising those drivers. In any case, it should be possible for fleets with PHYD telematics to negotiate with their insurers for premium discounts.

Influencing insurance products is not an area where governments have traditionally focussed attention but they could encourage uptake of the technology, including through government fleet operations. The support/encouragement of digital mapping of speed limits (already being undertaken for intelligent speed assistance - ISA) would also assist in the introduction of PHYD insurance in Australia.

Conclusion

Remarkable reductions in risky driver behaviour have been observed in trials of telematics-based incentives. PHYD insurance products have been successfully implemented in Europe and are evidently leading to substantial crash savings, reflected in insurance premiums being halved. Australia and other countries may gain road safety benefits by including PHYD insurance and associated telematics in their national road safety strategies.

Consumer demand for PHYD insurance should be encouraged - particularly now that at least one PHYD insurance product is available in Australia.

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