Transportation Research Part F 59 (2018) 401–417

Contents lists available at ScienceDirect

Transportation Research Part F

journal homepage: www.elsevier.com/locate/trf

Predicting young, novice drivers' intentions to install in-vehicle data recorders

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ARTICLE INFO

Article history:
Received 23 October 2016
Received in revised form 4 November 2017
Accepted 24 September 2018

Keywords:
In-vehicle data recorders
Novice drivers
Driving risk
Theory of planned behaviour

ABSTRACT

In-Vehicle Data Recorders (IVDRs) encompass a broad range of technologies that record information about the movement, control, and performance of a vehicle during normal driving situations and have emerged as an objective and valid way to monitor, research, and influence driver behaviour as well as prevent crashes. However, little is known as to the likely intentions to install this technology among those who may benefit the most from it, young novice drivers (17–19 year olds). The current research (a) assessed the extent to which young drivers favour using IVDR technology, and (b) identified personal characteristics and social cognitive processes that underpin their intentions to install this technology. The research drew on past research into the personal correlates of crash involvement, and social cognitive models such as the Theory of Planned Behaviour (TPB), to propose and test a predictive model of intentions to install an IVDR. Following an initial focus group phase, 424 novice drivers (220 males; age: $M = 18.25$, $SD = 0.73$) completed an anonymous online questionnaire measuring the study variables. Results suggested that most novice drivers are uncommitted about installing IVDRs in their cars, and most perceive weak, negative social pressure against the installation of IVDR technology. A regression model explained 55% of the variance in intentions to install an IVDR, with all three TPB variables, plus fear of the adverse consequence of not installing, identified as significant predictors. Concern about privacy of information was shown to be a major barrier to taking advantage of IVDR technology. The results provide insight into important beliefs and attitudes towards IVDRs and can be used to inform policy regarding an under-researched but plausible road safety initiative.

1. Introduction

In developed countries, road crashes account for approximately 25% of all deaths of young adults (15–24 years) and are the leading cause of death for this age-group globally (Lozano et al., 2012; World Health Organisation, 2015). Evidence for the greater prevalence of accidents, injuries, and fatalities among younger than older drivers comes from numerous sources. For example, across 23 OECD nations, young adults have been shown to have higher road fatality rates per head of population than both middle-aged road users and children (Bureau of Infrastructure, Transport and Regional Economics [BITRE], 2015). Crashes involving young drivers are at their highest point in the transition from supervised to independent driving (Lotan & Toledo, 2007; Preusser & Leaf, 2003; Williams, 2003). Evidence suggests that 16 year olds have higher crash rates when compared to 17 year olds (Guinosso, Johnson, Schulthesis, Graefe, & Bishai, 2016; Mayhew, Simpson, & Pak, 2003).

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https://doi.org/10.1016/j.trf.2018.09.017
1369-8478/

Finally, controlling for exposure (i.e. experience), crash-risk is still higher for young drivers than for older drivers (Deery, 1999; Jonah, 1986).

While vehicle and other factors may contribute to this age difference in road accident involvement, a growing body of research links reckless and/or risky driving behaviours to the high crash-rates among young drivers (Fergusson, Swain-Campbell, & Horwood, 2003; Ivers et al., 2009; Jonah, 1986; National Highway Traffic Safety Administration, 2009; Palamara et al., 2012; Traffic Injury Research Foundation, 2016). Consistent with this, a recent meta-analysis found that correlations between crashes and traffic offences were stronger in studies involving young, than older, drivers (Barraclough, Wahlberg, Freeman, Watson, & Watson, 2016).

Given the heightened crash-risk among young drivers (described by Groeger (2006) as the "young driver problem"), and evidence that these risks are largely attributable to unsafe driving behaviours, changing the careless, risk-taking, and/or reckless behaviours of young, novice drivers should reduce their risk of crash involvement. One promising, albeit relatively under-researched, approach to this problem involves the use of in-vehicle data recording (IVDR) technology. IVDRs encompass a broad range of technologies that record information about the movement, control, and performance of the vehicle during normal driving situations (Correia, Iliadis, McCarron, & Smolej, 2001; Lotan & Toledo, 2007; For a more detailed description, see Section 1.2). The current study examined young, novice drivers' attitudes to this technology. Using focus groups and an online questionnaire, the study aimed (a) to assess the extent to which young, novice drivers favour using IVDR technology, and (b) to identify the personal characteristics and social cognitive processes that underpin their intentions to install this technology. Theoretical and practical contributions of the research relate to understanding ways in which to facilitate the widespread and effective use of IVDR technology.

1.1. Addressing the young driver problem

Several approaches have been proposed to reduce the young driver problem. Two such strategies that have been implemented in many jurisdictions worldwide are Graduated Driver Licensing (GDL) and evidence-based novice driver education and training. With a fundamental purpose of providing "new drivers with opportunities to gain driving experience under conditions that minimise the exposure to risk" (Simpson, 2003, p. 27), GDL has been evaluated as broadly successful both in North America (Hallmark, Veneziano, Falb, Pawlovich, & Witt, 2008; Hedlund, 2007; Neyens, Donmez, & Boyle, 2008; Vanlaar et al., 2009) and more recently in Australia (Healy, Catchpole, & Harrison, 2012; Senserrick & Williams, 2012). Some sources have suggested that GDL has contributed greatly to large declines in per capita crash rates in teens (see Williams, Tefft, & Grabowski, 2012). However, the long-lasting effect of GDL is debated. For example, Lyon, Pan, and Li (2012) found that strong positive effects of GDL for drivers at age 16 are lessened as they get older. Masten, Foss, and Marshall (2011) found post-GDL increases in fatal crashes for 18 year-olds. While Australian research is notably more optimistic (Healy et al., 2012; Senserrick & Williams, 2012), some authorities have posited that reductions in fatal crashes through GDL requirements may have reached a point of diminishing returns (Scott-Parker, Goode, Salmon, & Senserrick, 2016; Williams, 2011), and may depend on parental engagement and skills (Naz & Scott-Parker, 2017).

Several factors possibly contribute to the mixed, and often modest and time-limited, effects of GDL. Evidence suggests that the positive effects of GDL are due more to reduced exposure to hazardous conditions than to enhancement of driving skills or motivation (Karaca-Mandic & Ridgeway, 2010; Lee, 2007). As usually implemented, GDL provides a timeline for relaxing restrictions on driving that is tied to driver age, rather than experience- or competence. Critics argue that this operates against the gaining of diverse and necessary driving experiences, leaving the driver, once fully licensed, inadequately skilled to manage hazardous conditions. Other limiting factors relate to less than complete adherence to the restrictions imposed, and a failure to adequately address risks associated with speed and driver fatigue. Overall, the evidence and arguments surrounding GDL suggest that there is a need for an approach that strengthens motivation to drive safely, while facilitating acquisition of skills relevant to the most challenging driving situations.

Driver education and training programs represent a second approach to reducing young driver crash involvement. Focusing primarily on car control and hazard perception skills (and incorporating safety messages throughout; Langford, 2002), novice driver education is widely practised and intuitively appealing. Researchers such as Lund and Rundmo (2009) argue that, when based on appropriate psychological principles, such interventions are effective in reducing reckless driving and vehicle crashes. However, there is currently a lack of scientific evidence demonstrating such training reduces young, novice drivers' crash involvement (Christie, 2001; Ker et al., 2005; Lonero & Mayhew, 2010; Lonero, 2008; Mayhew & Simpson, 2002; Vernick et al., 1999; Williams & Ferguson, 2004). Indeed, some evidence suggests that driver education can have effects that are opposite to those intended (Boase and Tasca, 1998; Ferguson, 2003; Mayhew and Simpson, 1996; Mayhew et al., 2003), such as contributing to more permissive attitudes towards unsafe driving behaviours (Glendon, McNally, Jarvis, Chalmers, & Salisbury, 2014). Critics have argued that many programs designed to modify driver behaviour are too broad-based, are seldom evaluated, and often fail to address the antecedents of specific reckless behaviours (Glendon, 2011; Schwebel, Severson, Ball, & Rizzo, 2006; Sheehan, Siskind, & Schonfeld, 2004).

In sum, while both the GDL approach and driving training programs may make useful contributions in appropriate circumstances, both have important limitations. Further reductions to the young driver problem from these approaches are likely to be modest. The current study taps into a burgeoning interest in a third, potentially valuable approach to this problem: IVDR technology, including its application as a feedback mechanism and its use in financial incentive schemes.