



Can rail pedestrian violations be deterred? An investigation into the threat of legal and non-legal sanctions



James Freeman*, Andry Rakotonirainy

Centre for Accident Research and Road Safety – Queensland (CARRS-Q), Queensland University of Technology, Australia

ARTICLE INFO

Article history:

Received 23 December 2014

Received in revised form 23 September 2016

Accepted 30 November 2016

Keywords:

Trains

Pedestrian level crossings

Deterrence

Legal and non-legal sanctions

ABSTRACT

Collisions between trains and pedestrians continue to be the most likely accident to result in severe injuries and fatalities on the rail network. While a range of countermeasures have been utilised in an attempt to reduce the incidence of risky behaviours at level crossings, limited focus has been directed towards deterrence-based approaches to improve crossing safety. As a result, this study explored pedestrians' perceptions of legal and non-legal sanctions at level crossings, with particular emphasis directed towards identifying factors that maximise perceptual deterrence and reduce the occurrence of rule violations. In total, 636 individuals volunteered to participate in the study that required completion of either an online or paper version of a questionnaire that focused on behaviours and perceptions. Participants were more likely to report intentionally violating level crossing rules (24.52%, $n = 156$) compared to making crossing errors (3.46%, $n = 22$). Knowledge of the possibility of sanctions (e.g., monetary fines) was low. The threat of being injured and feeling shame when breaching crossing rules were the highest reported perceptual deterrent factors, higher even than the certainty and severity of sanctions. Regression analysis revealed that males who had lower perceptions of certainty of apprehension and displayed a tendency to repeat the behaviour were most likely to deliberately break crossing rules. However, this group also recognised the physical risks of violating rules and that it breached social norms. In regards to identifying effective countermeasures, increasing police presence was considered the most effective approach to reduce violations, which is directly linked to deterrence processes such as increasing perceptual certainty. This paper will further outline the study findings in regards to perceptual deterrence-based research as well as provide direction for future research efforts to develop effective countermeasures designed to improve pedestrian safety.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Research continues to demonstrate that collisions that involve trains and pedestrians are the most likely to result in rail-related fatalities (Federal Railroad Administration, 2006; Nelson, 2008; Sochon, 2008). On average, two thirds of pedestrians do not survive being struck by a train (Lobb, Harre, & Terry, 2003). This statistic is higher than train-vehicle collisions (Australian Transport Safety Bureau, 2004), but is also quite frequent. For example within Australia, there were 392 fatalities

* Corresponding author at: Centre for Accident Research and Road Safety, Institute of Health and Biological, Innovation, K Block, 130 Victoria Rd Kelvin Grove Campus, Kelvin Grove 4059, Queensland University of Technology, Australia.

E-mail address: je.freeman@qut.edu.au (J. Freeman).

involving train pedestrian collisions between January 2001 and December 2010, not including suicides (Australian Transport Safety Bureau, 2011). Additionally, between 2003 and 2007, 51 people were hospitalised each year because of serious injuries after being struck by a train (Henley & Harrison, 2009). Such pedestrians are more likely to be males, school children, older pedestrians and those who have a physical disability (Llyod's Rail Register, 2007). As a result, an increasing research focus is being directed towards developing effective strategies to reduce the frequency of these events, which often occur at pedestrian level crossings that permit commuters to cross train tracks at designated pathways.

Currently, a number of outstanding research questions remain regarding both the origins of pedestrians' risky crossing behaviours as well as the effectiveness of various interventions designed to improve safety. One such question is whether collisions between trains and pedestrians result from pedestrians deliberately violating crossing rules or making errors while crossing tracks. While inconclusive, preliminary research indicates that (in contrast to vehicle drivers) pedestrians are more likely to deliberately violate crossing rules (Llyod's Rail Register, 2007). More specifically, pedestrians ignoring warning signs has been reported as a contributor in some United States studies (Federal Railroad Administration, 2008; Illinois Commerce Commission, 2005). The most common reason reported for such behaviour is because pedestrians are in a hurry e.g., maximising convenience (Daff & Cramphorn, 2006; Federal Railroads Administration, 2008; Llyod's Register Rail, 2007; Lobb, 2006; Lobb, Harre, & Suddendorf, 2001). Importantly, researchers have hypothesised that rule breaking may be reinforced if individuals consistently engage in the behaviour and avoid the negative consequences, otherwise known as *punishment avoidance* (CRC, 2010; Davey, Wallace, Stenson, & Freeman, 2008). However, it is also noted that pedestrians can also unintentionally become caught on train tracks (e.g., make an error) when a train is approaching, and it has been proposed that this stems from a lack of awareness about the presence of a second train coming (Federal Railroad Administration, 2008; Illinois Commerce Commission, 2005; Llyod's Register Rail, 2007).

In regards to interventions, scant research has examined the effectiveness of countermeasures designed to improve pedestrian safety at crossings (Cooperative Research Centre (CRC) for Rail Innovation, 2010; Edquist, Stephan, Wigglesworth, & Lenne, 2009; Lobb, 2006). The impact of media campaigns have yet to be thoroughly investigated and incapacitation-based measures (e.g., physically preventing pedestrians from crossing tracks with barriers/fences), are still being trialed (Cooperative Research Centre (CRC) for Rail Innovation, 2010). Preliminary research indicates that more warning signs at crossings result in increased crossing driver compliance (Lenné et al., 2011), although this has yet to be tested with pedestrians. Similarly, research on general traffic-pedestrian behaviour suggests that enforcement campaigns are not effective due to minimal fines not proving a strong enough deterrent threat (Schonfeld & Musumeci, 2003) as well as the perceived low risk of apprehension. A review of one of the few education interventions with school students in New Zealand highlighted that emphasising the legal consequences of being apprehended breaking the rules can reduce unsafe crossing behaviours, compared with general road safety education (Lobb et al., 2003).

In regards to the latter, it may be considered surprising that pedestrian rail crossing research has almost totally neglected to examine the impact that deterrent-based approaches can have on improving rail safety. Deterrence-based countermeasures often form a cornerstone of many injury prevention initiatives, particularly in the road safety arena such as drink driving, drug driving, speeding and mobile phone use. Classical deterrence theory, which was first proposed by Jeremy Bentham & Cesare Beccaria in the 18th Century, proposes that individuals will avoid offending behaviour(s) if they fear the perceived consequences of the act, in particular, the perceived certainty, severity and swiftness of sanctions (Freeman & Watson, 2009; Homel, 1988). Importantly, research has demonstrated that being exposed to a higher level of enforcement practices can reduce both offences as well as crashes (Watson et al., 2005). Deterrence-based approaches have proven extremely effective in reducing a range of risky behaviours in Australia, not least drink driving (Homel, 1988) and speeding (Fleiter, Guan, Xu, Ding, & Watson, 2013). Researchers have asserted that the most powerful deterrent effects on offending behaviour are produced by the perceived threat of the certainty of apprehension (Decker, Wright, & Logie, 1993; Homel, 1988; Nagin & Pogarsky, 2001).

However, since the 1970's a number of models have stemmed from, and expanded the scope of, the Classic Deterrence Doctrine, as it is recognised that penalties are not applied in a social vacuum (Paternoster & Iovanni, 1986). Rather, researchers have proposed that informal sanctions can reduce offending behaviours, such as the fear of social sanctions (e.g., peer disapproval), internal sanctions (e.g., feeling guilty or ashamed) and physical sanctions (e.g., fearing injury) (Homel, 1988). However, it may be argued that very little deterrence-based research has been undertaken within the last decade, despite the above mentioned reliance on such countermeasures to reduce injuries across a number of transportation domains. Given this (and the lack of current effective pedestrian countermeasures), it appears timely to consider pedestrians' current perceptions of deterrence in regards to rail interventions (e.g., likelihood of being apprehended for rule violations), including an examination of whether strengthening enforcement practices could result in improved pedestrian behaviour at level crossings. One of the few studies to focus on pedestrians' knowledge of penalties revealed that almost half of a sampled group did not believe or were unaware that it was illegal to cross when a train was approaching (Llyod's Register Rail, 2007). Researchers have also hypothesised that pedestrians may have poor knowledge regarding the penalties associated with breaching crossing rules (Wallace, 2008). Given this, the study aims to:

- (a) Examine whether participants are more likely to make deliberate violations compared with errors at crossings.
- (b) Explore current knowledge and experiences of enforcement practices.
- (c) Examine whether levels of perceptual deterrence (both legal and non-legal) influence the violation of crossing rules.
- (d) Identify the perceived effectiveness of current countermeasures to improve safety at crossings.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات