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Young drivers and their cars: Safe and sound or the perfect storm?

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ABSTRACT

Consistent with the experiences in high-income countries, young drivers remain overrepresented in road trauma statistics in low- and middle-income countries. This article pursues the emerging interest of approaching the young driver problem from a systems thinking perspective in order to design and deliver robust countermeasures. Specifically, the focus of this paper is the cars driven by young drivers. The study of vehicles' characteristics and their interaction with driving behaviour is, more often than not, considered a minor concern when developing countermeasures in young drivers' safety not only in developed nations, but especially in developing nations. Participants completed an online survey containing the 44-item Behaviour of Young Novice Drivers Scale Spanish version (BYNDS-Sp), in addition to providing information regarding their vehicle, any crash involvement, and driving offences. Based on the vehicle model information, the assessment of vehicle safety was conducted for three safety programs (ANCAP, Latin NCAP, U.S. NCAP). Young drivers in Colombia reported a breadth of risky driving behaviours worth targeting in broader interventions. For example, interventions can target speeding, particularly as three quarters of the participants drove small-medium cars associated with poorer road safety outcomes. Moreover, risky driving exposure was highly prevalent amongst the young driver participants, demonstrating the need for them to be driving the safest vehicles possible. It is noteworthy that few cars were able to be assessed by the Latin NCAP (with half of the cars rated having only 0–2 star ratings), and that there was considerable discrepancy between ANCAP, U.S. NCAP, and Latin NCAP ratings. The need for system-wide strategies to increase young driver road safety—such as improved vehicle safety—is vital to improve road safety outcomes in jurisdictions such as Colombia. Such improvements may also require systemic changes such as enhanced vehicle safety rating scales and investigation of the nature of vehicles sold in developing nations, particularly as these vehicles typically contain fewer safety features than their counterparts sold in developed nations.

1. Introduction

The transport system plays a critical social and economic role, but potential failures in this system can have negative consequences—such as injury and death—for system users (Ra'ed and Keating, 2014; Salmon et al., 2012b). A global perspective of transport system faults reveals that approximately 1.2 million people are fatally injured and a further 20–50 million non-fatally injured annually (WHO, 2015b), both directly or indirectly as a result of transport system failures which result in a road crash. The Decade of Action for Road Safety, 2011–2020, mandates ambitious fatality reduction targets for all motorised jurisdictions around the world (United Nations Road Safety Collaboration, 2011). Despite such mandates typically being met with consistent increases in the number and variety of road safety programs worldwide, some regions have not achieved their respective fatality reduction targets, and some regions have even demonstrated increases in the total number of crashes. For example, the European Transport Safety Council (ETSC) estimated in 2014 a total of 25,845 fatalities in the European Union, which means a 0.6% reduction compared to the previous calendar year in which 26,009 persons were fatally injured within the

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transport system, a result well below the ambitious target of a 6% reduction rate in transport system fatalities. Countries such as the UK, Germany and France were among the 12 EU state member that registered increases in fatal injuries in 2014 compared to 2013 (Adminaite et al., 2015).

Young drivers continue to be overrepresented in transport system failures as evidenced by fatalities and injuries arising from road crashes, with transport system failures the leading cause of death among young people globally (Toroyan, 2015). Moreover, the majority of road crashes, fatalities and injuries among young drivers aged 15–29 years occur in low- and middle-income countries (WHO, 2015a). It is noteworthy that all young drivers—irrespective of their country's socio-economic status—are at risk of transport system failures evidenced as road crashes due to a breadth of age- and inexperience-related factors (e.g., see Ferguson (2003). Furthermore, young drivers often intentionally engage in risky driving behaviours (e.g. mobile phone distracted driving or drink-driving) which increase the likelihood of transport system failures and, consequently, their crash and injury risk. The pervasive finding that a sub-group of young drivers engages in the greatest proportion of the most risky driving behaviours (e.g., travelling at speeds well in excess of posted speed limits) and correspondingly experiences transport system failures such as road crashes and police citations, i.e. 'problem young drivers' within the larger 'young driver problem' (Scott-Parker et al., 2013), demonstrates further the complexity of successful intervention with this at-risk group of transport system users.

The large scale of the young driver road safety problem specifically, and the road safety problem for users of all ages more generally, arising from failures in the transport system has principally motivated efforts toward the study of single causal factors of road trauma. However, crashes, the end-point of transport system failures (and herein referred to as 'transport system failures'), are multifarious events which often involve a broad set of contributors that can individually, and in combination, hinder analytical efforts. The findings of such systems-based analytical efforts are essential for efficacious interventions that result in improvements in young driver road safety. Recent applications of systems thinking to road safety have encouraged a shift in the perception of the poor road safety outcomes for young drivers from a young-driver-centric approach to a young-driver-road-safety-system-centric approach. Generally speaking, advocacy for a systems-based framing and analysis of the road safety problem has demonstrated the benefits of this approach in explaining system-wide factors, their interactions, and how failures can and do arise (Cornelissen et al., 2015). As such, transport system frameworks which integrate personal, infrastructural, and socio-technological factors not only help clarify contributors to poor transport system outcomes, they can support the development of effective countermeasures. This is particularly important given the marginal gains obtained in recent years due to the sole use of driver-centric-approaches and reductionist methodologies in road safety practices and, specifically, to remedy the young driver problem (Scott-Parker et al., 2016).

Within the scope of young driver road safety intervention, identifying (an) effective design(s) and delivery(ies) of (a) road safety intervention(s) has always been and remains a highly complex task due to the diversity of factors that influence safety outcomes, and therefore failures, within the transport system. Accordingly it is perhaps unsurprising that the efficacy of many intervention strategies targeting the young driver problem has mostly been low (Glendon et al., 2014). The primarily exposure-based intervention of graduated driver licensing (GDL) has been recognised as the most effective countermeasure to date (Williams, 2007). Similar to other motorised jurisdictions in which a GDL program is currently implemented, within the Queensland, Australia, context, GDL is a three-phase licensing program in which young novice drivers advance through a sequenced progression of driving privileges, conditions and restrictions. The first phase—the learner phase—is characterised by minimum entitlement age (16 years), minimum practice requirements (100 logbook hours, with 10 hours at night), and minimum durations (1 year) before undertaking a practical driving assessment. The second phase − the provisional phase—is characterised by two stages, with the first 1-year stage incorporating passenger and night-time driving restrictions, and the second 2-year stage during which these restrictions are relaxed after successful completion of a hazard perception test. The third phase—the open phase—is the unrestricted licence phase (Senserrick, 2007; Scott-Parker et al., 2011; Scott-Parker and Rune, 2016).

GDL can be mapped across Rasmussen's risk management framework (see Scott-Parker et al. (2016)) and involves multiple levels of intervention, ranging from state and national government who mandate and enforce GDL conditions and restrictions, to parents and driving instructors who supervise driving practice during the learner phase, to the roads upon which the young driver travels in their vehicle. Among infrastructural and technological factors within the transport system, vehicles exert a considerable influence upon the survivability of a transport system failure, and in the case of Queensland's GDL, high-powered vehicles (a power-to-weight ratio of more than 130 kW/tonne, https://www.qld.gov.au/transport/licensing/driver-licensing/applying/provisional/restrictions/) are prohibited during the first provisional licence phase. With regard to the relationship between vehicle characteristics and the intentional and/or unintentional engagement in risky driving behaviour of the young driver in command of said vehicle, research has examined the relationship between vehicle type and transport system failures. For example, research has suggested that drivers change their manner of driving depending on the vehicle in which they are seated. In the case of high-powered vehicles, a preliminary study by Rakotonirainy et al. (2006) reported, in a comparison of vehicle dynamics between 4WD and sedan driving, that drivers tend to travel faster and to accelerate more abruptly in 4WD vehicles compared to sedans. Although high-powered vehicles are a small fraction of the total death and injury toll, research suggests that these vehicles have a significantly higher crash and injury risk (Palamara et al., 2012; Keall and Newstead, 2013).

There is limited knowledge about whether young drivers who engage in more risky driving behaviour in general choose to drive vehicles with greater power-to-weight ratios, or whether drivers of cars with greater power-to-weight ratios choose to drive in a more risky manner. Young drivers' ownership of a vehicle has consistently been found to be a moderator of risky driving behaviour, such that young drivers with exclusive access to, or own their own vehicle, more commonly report being apprehended for a traffic offence (Scott-Parker et al., 2011) and intentional risky driving behaviour such as speeding (Klauer et al., 2011). In addition, research has revealed that certain vehicle features (such as vehicle size) could potentially increase risky driving behaviour. Wasielewski and Evans (1985) demonstrated that drivers in small cars were more cautious than those in larger vehicles, driving with shorter headway and larger speeds. Indeed, contrary to the purpose of the vehicle's safety features, vehicles with a larger number of safety features may actually result in intentionally risky driving behaviour through the selection of higher travelling speeds and shorter following distances (Horswill and Coster, 2002).

With regards to the survivability of drivers in transport system failures, an increasing body of research has clearly established a link between the age and the size of the vehicle in which the transport system failure occurs, such that smaller and older vehicles increase the likelihood and severity of injury outcomes (Blows et al., 2003; Mccartt and Teoh, 2015). Vehicle type also plays an important role, with Abu-Zidan and Eid (2015) noting that speeding in large vehicles (e.g., sport utility vehicles) is more likely to increase injury severity due to the increased risk of roll-over inherent in vehicles with a higher centre of gravity. Many regions world-wide, including Australia, have introduced a formal program that assesses and reports upon the safety of vehicles as an integral part of the global initiatives to assist in meeting the Decade of Action fatality reduction targets. To illustrate, Australia uses