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Age related annual crash incidence rate ratios in professional drivers of heavy goods vehicles

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ABSTRACT

Objectives: Evidence concerning crash risk for older heavy vehicle drivers is sparse, making it difficult to assess if it is prudent to encourage older drivers to remain in the workforce in a climate of labour shortages. The objective of this study was to estimate annual crash rate ratios of older male heavy vehicle drivers relative to their middle aged peers.
Methods: Data utilized in this study includes all crashes meeting inclusion criteria involving heavy goods vehicles, categorised as rigid trucks and articulated trucks; this data was recorded by the New South Wales Roads and Traffic Authority. The exposure to the risk of a crash was represented by distance travelled for each vehicle type and year, by age of driver, as estimated by the Australian Survey of Motor Vehicle Use. Negative binomial regression modelling was applied to estimate annual crash incidence rate ratios for male drivers in various age groups.
Results: A total of 26,146 crashes occurred in New South Wales during 1999–2006, involving a total of 54,191 vehicles; removing observations that did not meet the inclusion criteria, 19,736 observations remained representing 12,501 crashes. For rigid trucks, the incidence rate ratio for drivers aged 65+ years, compared to 45–54 year olds, was 0.74 (95% CI 0.51, 0.98). For articulated trucks, the annual crash incidence rate ratio for drivers aged 65+ years compared to 45–54 year olds was 1.4 (95% CI 0.96, 1.9), and that for drivers aged 55–64 years compared to 45–54 year olds was 1.1 (95% CI 0.83, 1.3).
Conclusions: Older male professional drivers of heavy goods vehicles have lower risk of crashes in rigid vehicles, possibly due to accrued driving experience and self-selection of healthy individuals remaining in the workforce. Thus, encouraging these drivers to remain in the workforce is appropriate in the climate of labour shortages, as this study provides evidence that to do so would not endanger road safety.

1. Introduction

Increased life expectancy and reduced birth rate in developed countries over the past few decades has resulted in the proportion of older adults growing considerably faster than the population as a whole. In nations such as Australia, ageing populations and declining birth rates impact the size of the workforce. It is expected that across all industries, including the transport industry, recruitment challenges are likely in the near future (Department of Employment and Workplace

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Relations, 2005. The transport and storage industry plays a significant role in a nation's economy; in Australia it contributes approximately 5.6% to gross domestic product and employs almost 5% of the workforce (National Road Transport Commission, 2003).

Whilst the ageing process affects individuals differently, even healthy older adults are likely to experience some level of functional decline in sensory, cognitive and physical areas (Anstey et al., 2005). Given that numerous functional abilities are important for safe and competent driving, it would be natural to suspect ageing to affect driving and lead to an over-involvement in crashes. However, evidence of relationships between declines in specific abilities and increased crash risk is sparse (Duke et al., 2010). This is particularly the case for heavy goods vehicle drivers' (also known as road transport drivers) crash risk for those over 60 years of age. This contrasts starkly with the large volume of literature on the well-known increased risk of crashes for younger drivers of heavy goods vehicles (Mooren et al., 2014).

Estimating crash rates is one of the most common ways to assess the risk of drivers. Rate calculation requires division of crash counts (i.e. crash frequency) by some measure of exposure (e.g. vehicle distance travelled) (Huggins, 2013; Islam and Mannering, 2006). As has been previously suggested, such normalisation equalizes for differences in intensity of use, making comparisons more meaningful, and it helps identify differences between different populations' characteristic crashes rates as a clue to causal factors (Hauer, 1995).

This is a limitation seen in studies of older drivers where the failure to include some measure of exposure. A question brought up by several researchers (Chipman et al., 1992, 1993; Hakamies-Blomqvist, 1998; Hauer, 1995; Kweon and Kockelman, 2003; Langford et al., 2005; Lord and Mannering, 2010; Tin Tin et al., 2010) is what measure of exposure is most appropriate in road safety research relating to risk and driver age? Five denominators of most often used:

1. per capita;
2. per number of licenced holders;
3. per distance travelled;
4. time spent driving; and
5. Household travel surveys to assess travel times.

Older professional drivers may be driving long distances, so the assumption that exposure is related to the number of licenced drivers or the proportion of the population in that age group, could lead to an inflated crash risk assessment for these drivers.

In addressing the increasing labour shortage, the question is raised as to whether it is wise to encourage older professional heavy vehicle drivers to remain in the transport sector for longer, particularly those of heavy goods vehicles. Whilst a more feasible solution to the predicted skills shortage in the transport industry is to recruit drivers of a younger age, this may not be viewed as a palatable solution with the public, regulators and insurance companies. Given the extensive media focus on the driving skills and attitudes of young drivers, any organisation suggesting encouragement of younger drivers into the transport industry needs to be sure that this does not present a risk to public safety.

1.1. Study aims and objectives

The aim of this study was to provide empirical evidence that would have capacity to both demonstrate the effect of age on driver performance and safety in professional heavy vehicle drivers and to assist in the formulation of strategies to meet the looming shortage of skilled professional heavy vehicle drivers in Australia. This was achieved by estimating and comparing annual crash incidence rate ratios of older heavy vehicle drivers relative to middle age drivers.

2. Materials and methods

This study utilised a retrospective cohort study design to analyse all crashes involving heavy goods vehicles between 1999 and 2006. Crash data from the New South Wales (NSW) Roads and Traffic Authority Traffic Accident Database System was used, together with distance travelled estimates from the Australian Bureau of Statistics Survey of Motor Vehicle Usage.

2.1. NSW roads and traffic authority traffic accident database

In Australia, all road and traffic crashes, involving the towing away of a damaged vehicle, person(s) requiring medical attention or fatality, are reported to police. In the state NSW, police reports are forwarded to the Road Safety Statistics Unit of the Roads and Traffic Authority where information from the reports is coded in accordance with the Traffic Accident Database System Coding System and entered into the Traffic Accident Database System database. It could be said that the crashes contained in this database are the more severe crashes. For this study, vehicle types were re-categorized as:

1. Rigid trucks exceeding 4.5 tonnes gross vehicle mass, constructed with a load carrying area, includes light rigid, medium rigid and heavy rigid trucks; and
2. Articulated trucks constructed primarily for load carrying, consisting of a prime mover and turntable device which is linked to semi-trailer; includes heavy and multiple combination vehicles (e.g. road train, B double).