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Milner, Allison, Page, Kathryn and LaMontagne, Anthony D. 2015, Suicide among male road and rail drivers in Australia: a retrospective mortality study, *Road and transport research*, vol. 24, no. 2, pp. 26-31.

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# Suicide among male road and rail drivers in Australia: a retrospective mortality study

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## Peer reviewed paper

This paper has been critically reviewed by at least two recognised experts in the relevant field.

Originally submitted: October 2014

## Abstract

*Objectives:* This paper aims to describe the epidemiology of suicide among males employed in driving occupations (road and rail) compared to other male occupations in Australia.

*Methods:* Suicide cases among road and rail drivers were extracted from a national dataset of occupationally coded suicide cases for the period 2001 to 2010. Suicide rates per 100 000 were calculated and standardised using the Australian standard population (2001). Incidence rate ratios (IRR) with 95% confidence intervals were calculated using Mantell Haenszel rates and compared to all employed suicide cases.

*Results:* The majority of suicides in this occupational category occurred in truck drivers, followed by road and rail drivers. 98% of these suicides were among males; hence only males were included in further analyses. The age-standardised rate of male suicide among Road and Rail drivers over the period 2001 to 2010 was 22.6 per 100 000 (95% CI 19.2 to 25.9). The IRR of suicide in this occupational group compared to other male occupations was 1.42 (95% CI 1.26 to 1.60).

*Conclusions:* Suicide among Road and Rail drivers is higher than in the other male occupations. Suicide prevention initiatives addressing these risk factors, while also providing access to treatment for those at risk, are clearly needed.

## INTRODUCTION

Road and rail drivers, like other lower skilled and lower status occupational groups, are at high risk of physical and mental health problems, including multiple forms of cancer and heart disease (Riise, Moen & Nortvedt 2003; Guberan et al. 1992; Hedberg et al. 1993; Bigert et al. 2003). Two past retrospective mortality studies have reported road and rail drivers may also have a higher prevalence of suicide than other groups (Agerbo et al. 2007; Andersen et al. 2010). These findings align with a

recent systematic review and meta-analysis, which has shown that lower skilled occupations – such as road and rail drivers – had considerably greater risk of suicide than higher skilled occupations (Milner et al. 2013). However, these studies did not examine road and rail drivers independently from other low skilled occupations, and did not discuss the risk factors for suicide that may be specific to this group of employed persons. Thus, there is a need for further examination of suicide occurring in this occupational group. We hypothesise that rates of suicide among road and rail drivers will be higher than that of other occupational groups. Using population level suicide data over a ten-year period, we also describe basic demographic characteristics of these suicides (age and gender), and discuss factors that may contribute to suicide rates in road and rail drivers based on past research.

## METHODS

### Design and data source

This retrospective case-series study utilised data from the National Coroners Information System (NCIS). NCIS is a national internet based data storage and retrieval system for Australian coronial cases, established in 2001. NCIS is utilised by coroners, government agencies and researchers for identifying cases for death investigation, research, and to monitor external causes of death in Australia. Previous to the advent of this database, researchers relied on mortality data provided by the Australian Institute of Health and Welfare, which provides relatively limited information on demographic factors such as occupation. NCIS provides users with basic demographic information, including employment status and occupation at the time of death. Ethical approval for this study was granted by the Justice Human Research Ethics Committee (Victoria) and the Melbourne School of Population Health Human Ethics Advisory Group.

### Eligibility and data extraction

All cases officially recorded as intentional self-harm in NCIS were extracted in January 2013 for the period 2001 to 2010. The raw data file included 26 471 individual cases. The years 2001 to 2010 were included in this study. Text descriptions of occupation and employment status at the time of death were extracted for each case. Data was also obtained on sex and age.

### Coding of occupation

Occupational information was coded by two researchers according to the Australian and New

Zealand Standard Classification of Occupations (ANZSCO) (up to the 6-digit level) (ABS 2009). If more than one occupation was reported, the researchers took the first listed as the primary occupation, unless the second listed occupation provided additional information that the first could not offer (e.g., transport/road driver). Ambiguous occupational information was coded at the broadest level or was marked as uncodable. Consensus was reached via discussion.

### Sample definition

Road and rail driver suicides were identified using the occupational information in NCIS case files. Those considered eligible for the study were coded under ANZSCO sub-group major group '73 – Road and Rail drivers'. This occupational group are described as drivers of cars, buses, coaches, trains, trams, vans and trucks to transport passengers and freight. All other occupations, coded according to ANZSCO represented the comparison group. This includes the rest of the working population, from general managers, and chief executives officers (ANZSCO major grouping 1) to general labourers (ANZSCO major grouping 8).

### Statistical analysis

Descriptive and frequency tests were used to assess suicide by age-group among Road and Rail drivers compared to all other occupations in NCIS. For each group, incidence suicide rates per 100 000 persons were calculated by dividing the total number of suicides in a year by the average number of people in that occupation using the 2001 census data. Rates were then multiplied by 100 000 persons. Following this, rates were directly standardised using the 2001 Australian standard population, yielding age-standardised rates expressed per 100 000 persons per year in the examined occupational groups.

Incidence rate ratios with 95% confidence intervals were calculated to compare the incidence of suicide in the population of interest (road and rail drivers) to that of the all other occupations. The incidence rate ratio (IRR) calculation was (*Equation 1*):

$$IRR = [d_1/T_1] / [d_0/T_0] \quad (1)$$

where:

$d_1$  = suicides in the 'road and rail drivers' category,

$T_1$  = person-years in 'road and rail drivers',

$d_0$  = suicides in all other occupations,

$T_0$  = person-years in all other occupations.

We used Mantel Haenszel (M-H) weights ( $w_i$  = weight for each rate ratio by age) to control for confounding related to age. The formula for this was (Equation 2):

$$\text{M-H IRR} = \frac{\sum(w_i * \text{IRR}_i)}{\sum w_i} \quad (2)$$

So, weights by age strata were multiplied by the IRR by age strata and then summed, and then divided by the sum of the weights.

## RESULTS

There were 513 suicides among Road and Rail drivers over the period 2001 to 2010. The majority of these (63%) were among truck drivers, followed by automobile (10%) and rail drivers (9.9%). A smaller proportion of cases comprised bus and coach drivers (7.6%), delivery drivers (6.24%), and train and tram drivers (2.73%). 98% of these suicides were among males (n=502). Due to this, only male suicide was analysed in this paper.

Differences in the age distribution of rail and road driver suicide compared to the rest of the male working population (all other occupations) (Table 1) suggests that road and rail drivers were slightly older, which is likely to reflect the fact that these people need a driver's license in order to be employed in this occupational group. These differences, however, were not significant in a chi-square test.

**Table 1**  
**Age-distribution of road and rail driver suicide in Australia, 2001 to 2010, males only**

	All other occupations (%)	Road and rail (%)
15-24y	12.8	3.8
25-34y	24.6	22.3
35-44y	28.0	33.7
45-54y	22.2	26.7
55-64y	12.4	13.5
Total (n)	7003	502

The overall age standardised rate of suicide among Road and Rail drivers was 22.6 per 100 000 (95% CI 19.2 to 25.9) over the period 2001 to 2010. The rate of suicide among all other occupations was 15.9 per 100 000 (95% CI 15.4 to 16.4). Both the

crude incident rate ratio (IRR) (IRR 1.42, 95% CI 1.26 to 1.60,  $p < 0.05$ ) and the Mantel Haenszel rate (controlling for age) (M-H IRR 1.42, 95% CI 1.26 to 1.60,  $p < 0.05$ ) support the hypothesis that road and rail drivers had a significantly higher suicide rate than all other occupational groups over the period 2001 to 2010. The rate of suicide among road and rail drivers was also considerably higher than the general male suicide rate over the period 2001 to 2010 (between 15 and 17.5 per 100 000) (ABS 2013).

## CONCLUSION

The main result of this paper is that male road and rail drivers had significantly higher suicide rates than other male occupational groups over the period 2001 to 2010. It is likely that the rates of suicide by occupation were even higher than we have reported in this paper due to problems in the under-reporting of suicide and its miscoding as other causes of death (e.g. undetermined and accidental) (De Leo et al. 2010). It is also possible that occupations were incorrectly coded, despite the use of two coders and standardised coding framework. It is a further limitation that we were not able to provide greater information on differences by gender and by specific job title, recognising that there may be marked differences in the risk factors facing drivers in different industries (e.g. taxi driving versus long haul trucking). Even within the category of truck drivers, which is where the bulk of suicides occurred over the time period examined, there is considerable diversity in operational environments pertaining to short distance (local), long-distance intrastate and long-distance interstate drivers.

Notwithstanding these limitations, our results align with international studies demonstrating the generally worse health (Riise et al. 2003; Guberan et al. 1992; Hedberg et al. 1993; Bigert et al. 2003) and higher rates of suicide in occupational drivers (Agerbo et al. 2007; Andersen et al. 2010). The rate of suicide in road and rail drivers in Australia is similar to that found in Britain (Roberts et al. 2013), and is roughly equivalent to other male dominated transport or physically demanding jobs (Roberts, Jaremin & Lloyd 2013; Andersen et al. 2010).

The main risks identified for poor health among road and rail drivers are connected to their worse health behaviours (e.g. alcohol consumption and smoking), and greater exposure to poor psychosocial working conditions such as high job strain, job dissatisfaction, fatigue, and turnover (Blonk et al. 2002; de Croon et al. 2004). Similar to other low skilled workers, for example, those in the construction industry (who are also an at risk group in terms of suicide) (Milner et al. 2014),

truck drivers have difficulty recovering from work during off-work time (leading to a prolonged experience of work stress), particularly amongst those working irregular hours. Previous research suggests that these psychosocial job stressors are associated with a higher risk of suicide (Ostry et al. 2007; Schneider et al. 2011), although these studies have not specifically examined road and rail drivers as an occupational group. However, based on the above, we speculate that the work-related stressors faced by those employed in rail and road professions contribute to their higher rates of suicide.

There are numerous possible other reasons for the higher burden of suicide among road and rail drivers. First of all, this could be indicative of a wider socio-economic disadvantage (Lorant et al. 2003), as individuals employed in these jobs were among the lowest skilled workers in the Australian population, who would also tend to earn the least and be the least educated. Another possible explanation for this result may be the male sample. In Australia and many other countries, males tend to have markedly higher suicide rates than women (ABS 2013). The reason for this is attributed to a range of factors, including a lack of help seeking, the likelihood of them choosing more lethal suicide methods than females, and cultural and normative stereotypes around masculinity (Moller-Leimkuhler 2003).

Future research should focus on providing a better description of mental health problems and suicide among road and rail drivers, focusing particularly on differences by gender (we were unable to assess female suicide in this paper due to low numbers) and by specific job, including both qualitative and quantitative studies. We also wish to qualify our results by noting that there has been considerable investment in road traffic safety in Australia, and corresponding to this, the number of road fatalities has decreased by more than half in Australia since 1970 (ABS 2012). Past research suggests that the marked decline in traffic injury deaths reflects the success of road safety intervention strategies implemented across the country (Richter et al. 2006; Stevenson & Thompson 2014) and investment in ongoing research into safety and road use (including its occupational health and safety dimensions) (see for example Feyer & Williamson 1995; Driscoll et al. 2002; Feyer, Williamson & Friswell 1997; Stevenson & Thompson 2014). Nevertheless, occupational driving-related injury and mortality has been under-addressed relative to the size of the problem, and warrants further research as well as policy and practice attention (Stuckey, Lamontagne & Sim 2007; Stuckey et al. 2010).

To our knowledge there are few if any suicide prevention initiatives in the driving occupations employment sectors. Following best practice in workplace suicide prevention (WHO 2006), these initiatives should involve both identifying and managing occupational stressors (e.g. reward and recognition at work, social support, reducing job demands), promoting mental health and mental health literacy, and ensuring the access to treatment and rehabilitation is provided for those at risk in this occupational group, as we have described previously with respect to workplace mental health programs across the working population (LaMontagne et al. 2014).

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**ACKNOWLEDGEMENTS**

This work was supported by the American Foundation for Suicide Prevention (SRG-1-091-13), the Australian National Health and Medical Research Council Capacity Building Grant in Population Health and Health Services Research (ID: 546248) and a Centre grant from the Victorian Health Promotion Foundation (Melbourne). The funding source had no involvement in the study design; collection, analysis and interpretation data; the writing of the report; or in the decision to submit the paper for publication.