

# Peer-reviewed papers

## Prevalence of affective states in Australian truck and train drivers

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*This paper is an extended version of an earlier conference poster that was presented at the ARSC 2015. It has undergone further extensive peer review; revised with additional material added.*

### Abstract

Within this exploratory preliminary study, data is presented regarding the prevalence of specific mood states within a sample of Australian truck and train drivers. A total of 49 heavy vehicle truck drivers and 58 train drivers were recruited from the local community. Subjects completed a mood state questionnaire. Numerous mood states (tension-anxiety, depression-dejection, anger-aggression, fatigue-inertia, confusion-bewilderment and total mood disturbance score) were found to be significantly higher ( $p < 0.05$ ) in the truck-driving sample than the train driving sample, and higher than the advised normative values.

### Keywords

Depression, Truck driving, Train driving, Mental illness, Mood states

### Introduction

The professional driving industry plays a vital role in the movement of people and goods and in the prosperity of Australia. A combination of extensive distances between industries and a low population density has resulted in a large reliance upon road and rail freight. Occupational conditions within Australia's heavy vehicle and train driving industries are often comparable, frequently requiring both physiological and psychological demands. Long hours spent sitting, workplace isolation, sporadic rest and work cycles, monotonous driving conditions, the pressure to meet delivery schedules and the need for continuous alertness are some of the common inherent occupational demands of these two industries, some of which may contribute to impaired driver health. Mood or affective disorders such as depression have been frequently reported in overseas epidemiological studies of mental health within the professional driving industries (da Silva, 2009), however the paucity of literature regarding the incidence of depressive symptomatology within an

Australian sample of professional drivers is concerning. Depression has been increasingly correlated to a reduction in driver performance, with recent studies having found that severe and extremely severe depression in truck drivers resulted in a significantly increased odds ratio (4.4 and 5.0 respectively) for an accident or near miss (Hilton, 2009). Studies have also found links between self-reported negative mood states and electroencephalography fatigue indicators (Lal, 2002). It is important to ascertain accurate statistics regarding the incidence of depression and other negative mood states within these professional drivers in order to provide the foundation for the improved management of these illnesses within these occupational fields.

There is an increased incidence of the affective disorder, depression within the professional driving industry. A study conducted by Hilton and associates (Hilton, 2009) found that 13.3% of Australian heavy vehicle truck drivers demonstrated at least a mild form of depression (as measured by the Depression, Anxiety and Stress Scale (Lovibond, 2002) in contrast to the national rate of 11.6% (World Health Organisation, 2009). In comparison, a study by da Silva-Junior and team (da Silva, 2009) found that 13.6% of the truck drivers ( $n=300$ ) suffered from depression (as diagnosed through the section Major Depressive Episode in the Mini International Neuropsychiatric Interview (Sheehan, 1998). Supporting this, Wong and team found that 14.5% of truck drivers felt more depressed once commencing work within the truck driving industry (Wong, 2007). Recently, work stress has been heavily implicated as an independent predictor of depression (Wang, 2005). The common workplace conditions mentioned previously imply that truck drivers can be viewed as a depression vulnerable population. Furthermore, the association of long working hours with increased incidence of depression has been supported by a study by Virtanen and colleagues which found that working more than 11 hours per day demonstrated an increased odds ratio for developing depressive symptomatology (Virtanen, 2012).



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Despite the previously mentioned, well-documented high rates of depression amongst professional truck drivers, at present, there have been few epidemiological studies regarding the presence and effects of depression within truck and train drivers in Australia. Although a National Standard for Health Assessment of Rail Workers (National Transport Commission, 2012) has been implemented within the rail industry, which assesses psychological disorders amongst a range of health conditions, the true prevalence of depression within this industry remains somewhat unclear. With train drivers in Australia frequently subjected to comparable working conditions to that of truck drivers (such as long working hours, monotonous driving conditions, etc.), it would stand to reason that there may be an elevated risk of depression in both professions. As such, elucidating the rates and effect of depression in drivers within these transport industries is an important safety issue in Australia.

In Australia, rail suicide accounts for 6-8% of the nation's death by suicide, totalling approximately 150 rail-related deaths per annum (Lifeline, 2012). Witnessing rail-suicide is a serious issue that has been known to result in extreme psychological distress that can progress into a number of psychological conditions such as depression (Cothureau, 2004). A study conducted by Cothureau and associates in France (Cothureau, 2004) assessed 388 train drivers, either those having been exposed (n=202) or not-exposed

(n=186) to a rail suicide whilst operating a train. The study found that those individuals in the exposed cohort had significantly higher rates of post-traumatic stress symptoms ( $p<0.0001$ ), somatic symptoms ( $p<0.0001$ ), anxiety and insomnia ( $p<0.001$ ). A total of 1.5% of the assessed drivers exhibited severe depression; with other affective disorders also being observed, such as generalised anxiety disorder (4.0%), dysthymia (1.0%), panic disorder (0.5%) and manic episodes (0.5%). Collectively, these findings provide a unique insight into the acute occupational stressors encountered by train drivers, and the psychological effects of these stressors. Another study, assessing the psychological health of train drivers, conducted by Loukzadeh and associates (Loukzadeh, 2013), found that 15% of the 152 train drivers assessed exhibited scores of greater than 19 on the Kessler Psychological Distress Scale (Anderson, 2013), indicating that they were likely to have a mild, moderate or severe mental disorder. Although this study did not assess depression specifically, it does provide some evidence for the impaired psychological health of individuals within this field.

When we consider the acute and chronic effects of depression on the quality of life of an individual, it is clear that elucidating the true prevalence of affective disorder within the rail and truck industries is vital to preserving the health of drivers in these industries. The effect of managing depression in these drivers would not only benefit

the drivers but will also be beneficial to employers who employ these drivers. A recent PricewaterhouseCoopers report estimated that Australian businesses will lose \$10.9 billion annually for neglecting to address mental health in the workplace (PricewaterhouseCoopers, 2014). However, businesses that take action will, on average, experience a return of \$2.30 for every \$1 invested in initiatives that promote improved mental health in the workplace. The transport industry boasts an even higher return, with an average of \$2.80 returned for every \$1 invested (PricewaterhouseCoopers, 2014).

However, of concern is the scarcity of studies regarding depression in the trucking and train driving industries in Australia. Aside from the aforementioned study conducted by Hilton and associates (Hilton, 2009), the rate of depression in Australian heavy vehicle drivers has been somewhat overlooked. Of further concern are the statistics regarding the adverse effects of depression on driver performance. Furthermore, the likelihood of seeking appropriate medical advice for the management of depression in Australia is disturbing; with a recent Australian Bureau of Statistics survey finding that only 35% of Australians who had experienced a mental illness in the prior 12-month period had sought to access appropriate medical assistance. Despite a higher incidence of depression amongst females when paralleled with males in Australia (14.5% and 8.8% respectively), (Australian Bureau of Statistics, 2007), a well-established social perception, which discourages males from seeking medical assistance, has resulted in lower diagnostic rates of affective disorders among males (Klint, 2004). Due to the severe gender bias of the truck and train driving industries, an underlying incidence of undiagnosed affective disorders may be present, supporting the investigation of this mental disorder within drivers in this occupation.

Therefore, the aim of the present exploratory, preliminary study was to assess the presence of mood (affective) states within the Australian trucking and train driving community. By understanding and evaluating the presence and effect of depression in the Australian truck and train driver community, we would be able to provide the quantitative information required for management practices geared towards reducing the effects of these disorders on driving ability, and thus, contribute towards improving road safety in Australia, as well as extrapolate the benefit internationally.

## Methods

### Participants

A total of 49 truck drivers (mean age  $36.50 \pm 9.67$ ,  $n=45$  males,  $n=4$  females) and 58 train drivers (mean age  $39.16 \pm 10.51$ ,  $n=53$  males,  $n=5$  females) were recruited. Participants were recruited through local advertisement via a poster, recruitment through contacts established independently to this research, online forums and with the aid and endorsement of Australia Post Transport Division, Sydney Trains and the Australian Trucking Association. Participants

were required to be employed as a truck driver, regularly driving a truck with a gross vehicle mass of over 4.5 tonne, or a currently employed train driver.

### Procedure

The study was comprehensively detailed to the subject upon arrival, with the opportunity for questions being posed. Upon receipt of written consent, the study was commenced. The following questionnaires were administered in the study.

### SmartData questionnaire

The SmartData questionnaire (modified from a questionnaire developed in-house (Kavanagh, 2007) helps obtain demographical information regarding licensing, trucking history, employment status, nutrition, accident history and working conditions. This questionnaire was utilised as a basis for possible stratification of data, and to ascertain common conditions of truck driving in Australia.

### Profile of Mood States questionnaire

The Profile of Mood States questionnaire (POMS) (McNair, 1971) is composed of 65 items describing six mood subscales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. An overall measure of total mood disturbance is calculated for all six subscales by combining the scores obtained on the tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia and confusion-bewilderment scales minus the score on the vigor-activity scale. The depression-dejection subscale has been shown to be strongly predictive of the Beck Depression Inventory-II (BDI-II) (Beck, 1996), which is often used in clinical practice to diagnose depression. The depression-dejection subscale of the POMS is consequently considered a useful short alternative to the BDI-II, since it also investigates other components of mood such as anxiety and aggression (Griffith, 2005). The POMS questionnaire is a subjective measurement of well-being, and is an assessment of an individual's mood state during the previous week, including the day of participation. This questionnaire is a reliable, low cost, ergonomic psychometric tool that has been highly validated by numerous previous studies (Norcross, 1984). The participant was asked to tick the box that corresponded to the intensity of each feeling stated, from "Not at all" to "Extremely" through a five-point progression from 0 to 4. For example, next to the feeling "Angry", a participant may either mark "Not at all", "A little", "Moderately", "Quite a bit" or "Extremely". After the completion of this questionnaire, the scores for each subscale, and a total mood disturbance score, were calculated. Normative values for the POMS questionnaire were obtained from a study conducted by Nyenhuis and associates which prepared normative adult values using a sample of 400 individuals (Nyenhuus, 1999), who were age-, gender-, and race-stratified according to 1990 census data.

## Results

Using independent sample t-tests, it was ascertained that the train and truck driving samples were age ( $p = 0.12$ ) and body mass index (BMI) matched ( $p = 0.28$ ) (Table 1).

**Table 1. Descriptive statistics of current sample**

Sample group	Mean BMI	Mean age (years)
Train drivers (n= 58)	29.1 ± 4.86	39.16 ± 10.51
Truck drivers	28.5 ± 3.40	36.50 ± 9.67

*BMI = Body mass index (weight (kilograms)/height (m<sup>2</sup>))*

Truck drivers presented significantly higher levels of negative mood states than train drivers (Table 2). Tension-anxiety ( $p = <0.0001$ ), anger-aggression ( $p = 0.004$ ), fatigue-inertia ( $p = 0.023$ ), depression-dejection ( $p = <0.0001$ ), confusion-bewilderment ( $p = <0.0001$ ) and total mood disturbance ( $p = <0.0001$ ) were all significantly higher in the truck driving sample than in the train driving sample. It should also be noted that through single sample t-tests, it was ascertained that scores were higher for all negative mood states and lower for vigor activity in the truck driving sample than the advised normative values (Nyenhuis, 1999). The train driving sample presented scores comparative to normative values for all mood states, other than confusion-bewilderment and vigor-activity, which were significantly lower than advised normative values.

## Discussion

The present preliminary study identified a concerning trend of high levels of negative mood states within the Australian truck driving sample. Levels of all negative mood states in the truck drivers were both higher than the advised normative values, and the train driving sample scores. High levels of negative mood states have been consistently linked with a decrease in driver performance (Hilton, 2009; Lal, 2002), which when considered alongside the high levels of negative mood states reported within the truck driving sample, raises concerns about driving safety and warrants further investigation.

Tension-anxiety, anger-aggression, fatigue-inertia, depression-dejection, confusion-bewilderment and total mood disturbance were all found to be significantly higher in the truck drivers compared to the train drivers. Impaired mental health in the workplace elicits negative impacts on both employees and employers and can compromise work performance and safety. From increased absenteeism (PricewaterhouseCoopers, 2014), to high numbers of approved compensation claims for mental or stress related illnesses (Safe Work Australia), neglecting to appropriately address psychological based illness can impact negatively on all parties involved. As previously mentioned, Australian businesses will lose \$10.9 billion annually for neglecting to address mental health issues in the workplace (PricewaterhouseCoopers, 2014). However, the return for industries that invest in mental health schemes is both economically beneficial, and valuable to ensure employee health and transport safety.

**Table 2. The average scores attained for the six mood subscales, the total mood disturbance score in truck (n=49) and train drivers (n=58) and normative values ±**

Sub-scale	Truck driver mean score	Truck driver mean score	Normative values (Adult population)
Tension-anxiety	12.8 ± 5.4*#	5.9 ± 5.6	7.1 ± 5.8
Anger-aggression	10.2 ± 6.3*#	5.6 ± 7.1	7.1 ± 7.3
Fatigue-inertia	13.0 ± 6.4*#	8.3 ± 6.2	7.3 ± 5.9
Depression-dejection	16.3 ± 10.2*#	5.6 ± 7.4	7.5 ± 9.2
Confusion-bewilderment	10.0 ± 4.9*#	3.8 ± 2.1#	5.6 ± 4.1
Vigor-activity	11.1 ± 5.3*#	17.7 ± 4.7#	19.8 ± 6.8
TOTAL MOOD DISTURBANCE	51.3 ± 34.2*#	13 ± 22.0	14.8 ± 32.9

Key:

\* = significantly different to train driving sample ( $p < 0.05$ )

# = significantly different to advised normative values ( $p < 0.05$ )

## Conclusion

Collectively, the findings from the present preliminary study provide a novel perspective on the mental health of Australian truck and train drivers. The present study addressed the gaps in research by assessing a number of mood states (tension-anxiety, depression-dejection, anger-aggression, fatigue-inertia, confusion-bewilderment and total mood disturbance score) within these understudied occupational industries. The preliminary study found that multiple mood states were significantly higher in the truck-driving sample than both the train driving sample, and the advised normative scores. This provides evidence for future research into the incidence of these negative mood states within these understudied industries.

There are a number of limitations within the current preliminary study. Sample size, whilst large enough to provide adequate sample power, should be increased for each sample group (truck and train drivers) in order to provide a representative distribution of the population, and ensure that results are able to be generalised across each of the occupations. Furthermore, drivers were recruited from the Sydney area, and thus, may not be representative of the entire Australian driver population for each sample. Future studies may benefit from recruitment of drivers from a number of suburbs and states across Australia.

Drawing from preceding literature, reducing the incidence of these negative mood states could work to improve mental health within the truck driving industry, and in turn, increase driver performance, thereby improving road safety in Australia. It is vital, however, that future studies use larger sample populations and recruit professional truck and train drivers from a number of different suburbs and states across Australia to ensure an accurate representation of each of the occupational populations.

These preliminary findings provide evidence for further investigation into the incidence of negative mood states within these two occupational fields. Considering that heavy vehicle accidents reportedly cost Australia approximately \$2 billion each year (Bureau of Infrastructure Transport and Regional Economics, 2009), quantitating the presence of mental disorders, and improving the mental health profile of these individuals may, in turn, reduce the effects of disorders such as depression on driving ability. Road safety in Australia is a vital aspect of the transport industry that requires a holistic, well-researched management approach. By incorporating mental health and psychological management schemes, the safety advantages in terms of improved driver ability and performance, and reduction in both absenteeism and psychological disorders, would be highly beneficial.

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# Safety culture and speeding in the Australian heavy vehicle industry

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## Abstract

Inappropriate speed and speeding are among the highest causes of crashes in the heavy vehicle industry. Truck drivers are subjected to a broad range of influences on their behaviour including industrial pressures, company monitoring and police enforcement. Further, drivers have a high level of autonomy over their own behaviour. As such, it is important to understand how these external influences interact with commonly shared beliefs, attitudes and values of heavy vehicle drivers to influence behaviour. The present study uses a re-conceptualisation of safety culture to explore the behaviours of driving at an inappropriate speed and speeding in the heavy vehicle industry. A series of case studies, consisting of interviews and ride-along observations, were conducted with three transport organisations to explore the effect of culture on

safety in the heavy vehicle industry. Results relevant to inappropriate speed are reported and discussed. It was found that organisational management through monitoring, enforcement and payment, police enforcement, customer standards and vehicle design factors could all reduce the likelihood of driving at inappropriate speeds under certain circumstances. However, due to weaknesses in the ability to accurately monitor appropriate speed, this behaviour was primarily influenced by cultural beliefs, attitudes and values. Truck drivers had a tendency to view speeding as relatively safe, had a desire to speed to save time and increase personal income, and thus often attempted to speed without detection. When drivers saw speeding as dangerous, however, they were more likely to drive safely. Implications for intervention are discussed.