

# Driving Health Study

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Survey of the physical and mental  
health of Australian professional drivers

**November**  
**2020**

**This report would not be possible without the contribution of the thousands of Australian Truck Drivers who completed the survey. Thank you!**

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This report uses data collected as part of an online survey. Receipt, use and disclosure of the data for this study was approved by Monash University Human Research Ethics Committee (MUHREC) on 12 June 2019 (Project ID:19191).

**Centre**  
for WHS



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# Executive summary

Previous reports from the Driving Health study provided a broad overview of work-related injuries in Australian truck drivers and identified this cohort as being at significantly higher risk of injury and illness at work <sup>[1–5]</sup>. However, these approaches do not provide a full picture of the health profile of the Australian truck driving workforce. An overarching aim of the Driving Health study is to generate new data specific to the health of Australian drivers.

This report, the sixth in the Driving Health study, presents findings from an online national survey of Australian truck drivers in order to:

1. Characterise the physical and mental health of Australian truck drivers.
2. Identify the work, personal, social, environmental, regulatory and health determinants that influence health outcomes and driving performance.
3. Determine whether there are differences in the determinants of health and performance between long-haul and short-haul drivers, and between employee drivers and owner drivers.

## Methods

Australian truck drivers were recruited through a multipronged sampling approach to complete a ten-minute online survey providing an overview of the physical and mental health of drivers and the factors affecting their health and driving performance. Questions captured a range of personal factors (such as age and gender), work factors (such as working hours and payment type) and health risk factors (such as diagnosed medical conditions and body mass index). Based on responses to work related questions, drivers were identified as either short-haul (< 500km) or long-haul (≥500km), and as an employee driver or owner driver. Health outcomes measured included general health, pain, psychological distress and health related quality of life. Driving performance outcomes included number of crashes, near misses and self-rated work ability. The specific impact of health, personal and work factors on health and driving performance outcomes was assessed with multivariate regression analysis.

## Health profile of drivers

The survey was attempted by nearly 2,500 drivers, of which 1,390 complete surveys were eligible for analysis. The majority of drivers were employee drivers (85.5%) and more than half were short-haul drivers (60.2%). As expected, most drivers were male (97.1%). Over a third (37.5%) reported working more than 60 hours a week.

Over half (54.3%) of the drivers were categorised as obese, compared to the national average of 32.5%. Over a third of drivers reported receiving a diagnosis of back problems (34.5%) and high blood pressure (25.8%). Mental health problems, such as depression and anxiety, were also common with 19.4% reporting a diagnosis in the last year. Almost a third of the drivers completing the survey (29.5%) reported being diagnosed with more than two of the health conditions listed, compared to 7.8% of the general population.

## **Health and performance outcomes**

Half of the respondents reported having some level of psychological distress (50.0%). However, one in five drivers under 35 years reported having severe psychological distress compared to the national average of one in nine in the same age group. The proportion of truck drivers rating themselves as being in fair to poor general health (29.9%) was almost double that of the national average for Australian males (15.8%). Chronic pain was a common affliction among respondents as the majority (71.4%) of those reporting pain stated it had lasted more than 3 months. Drivers reported significantly lower health related quality of life scores compared to a normative Australian population (mean 0.83 (SD 0.16) vs 0.91 (SD 0.14),  $t=15.9$ ,  $p< 0.001$ ).

Just 13.0% of the drivers reported having a crash in the past year. Near misses occurred more frequently with 71.7% reporting near misses on average once per week. The majority of drivers rated themselves as having good (40.6%) or excellent (28.0%) work ability.

## **Determinants of outcomes**

Data analysis revealed that younger age, long working hours, vehicle type and number of diagnosed health conditions were associated with reporting severe psychological distress. Relative to drivers with no conditions, the odds of having severe psychological distress nearly doubled with each diagnosed health condition.

Working hours, body mass index (BMI) and number of diagnosed conditions were associated with poorer general health. The odds of a driver suffering from severe or chronic pain increased significantly with the number of diagnosed health conditions. Working hours and the number of diagnosed conditions were related to the health utility score (quality of life) of drivers.

The only factor significantly associated with increased odds of experiencing a crash in the last year was being diagnosed with 3 or more health conditions (OR 1.77, 95% CI, 1.13-2.78). Age, increased working hours/week and number of diagnosed conditions were significantly associated with higher odds of experiencing more than 10 near-misses per week. The type of vehicle driven, BMI and number of diagnosed conditions all had a significant impact on work ability.

## **Differences between types of drivers**

Short-haul drivers reported significantly higher levels of psychological distress than long-haul drivers. Long-haul drivers were more likely to be obese and report pain lasting more than 12 months compared to short-haul drivers, but less likely to report severe psychological distress or report a having had a crash in the previous 12 months. Owner drivers were more likely to report very good health when compared to employee drivers.

## **Implications**

The physical health of truck drivers can be characterised as poorer than the Australian average. The rate of drivers having three or more conditions was almost four times the rate of the Australian population [25]. Back problems were the most common condition reported in our sample of truck drivers, similar to previous report findings that musculoskeletal injury was the most common type of work-related injury. These factors, alongside the high prevalence of severe and long-standing pain, paint a picture of poor physical health in truck drivers.

Characterising mental health is somewhat more nuanced, with more drivers under 35 years of age and fewer drivers over 45 years reporting severe psychological distress compared to the national average. Previous reporting demonstrated suicide was a leading cause of death of drivers under 40 [5]. Future mental health initiatives should not only address the capacity of drivers to cope with the stresses of the job, but also aim to reduce psychological strain, especially for young drivers.

The number of chronic conditions reported by drivers was a consistent predictor of not only health outcomes, but also driving performance outcomes and self-rated work ability. Having three or more chronic conditions nearly doubled the odds of experiencing a crash, underlining the importance of prevention and management of chronic health conditions in drivers. Helping drivers to be healthy and stay healthy at work will benefit drivers, employers and the industry in general.

Other determinants observed as consistent predictors of the outcomes measured were the number of hours worked and age. The findings suggest that working long hours places Australian truck drivers at greater risk of poorer mental and physical health, while exposing drivers to a greater likelihood of near misses at work. Being experienced led to fewer near misses and was a protective factor against psychological distress.

## **Conclusion**

The profile of physical health of truck drivers in Australia is poor. Truck drivers are more likely to be overweight, report poor general health and be diagnosed with multiple chronic health conditions compared to the rest of the population. The profile of mental health is poorer for drivers under 35 years of age, but better for drivers over 45 when compared to the general population. This study provides useful baseline data that establish a health profile of Australian truck drivers. It highlights the need for mental health interventions, particularly for younger drivers, and interventions targeted towards the prevention and management of chronic health conditions, to help drivers be healthy and stay healthy at work.

Future work in this area will examine the contribution of a wider range of work, personal, environmental and regulatory factors to driver health.

# Overview of the project

## Rationale

Driving Health is a three-year study aiming to develop evidence on the health status of transport workers and factors affecting health, and provide recommendations for interventions to improve driver health. Through a series of five reports analysing workers' compensation and life insurance claims data, the study has so far demonstrated that workers in the transport sector are at increased risk of work-related injury and disease <sup>[1]</sup> and that crashes only account for 17% of the burden of injury and illness amongst truck drivers <sup>[2]</sup>. Services for mental health are infrequently accessed in the early phase of an injury <sup>[3]</sup> and drivers do not always receive evidence-based care <sup>[4]</sup>. Finally, cardiovascular disease is the most common cause of death of drivers, but younger drivers are at greater risk of suicide <sup>[5]</sup>.

These reports in the Driving Health series have captured important information on work-related illness or injury and mortality in Australian truck drivers. However, these approaches are limited and do not provide a full picture of the health profile of the Australian truck driving workforce. Notably, the true burden of mental illness and chronic disease in Australian truck drivers remains unknown. Other limitations include a lack of information on predictors of illness and injury beyond demographic and basic occupational information. Identifying risk and protective factors can inform prevention and rehabilitation strategies with the objective of improving the health and wellbeing of Australian truck drivers.

There are other notable factors specific to the industry that may influence the health of drivers. It has been proposed that occupational and health risks differ between drivers driving long distances (long-haul, >500kms per day) and drivers covering shorter distances, typically in metropolitan areas (short-haul, <500kms per day). Long-haul drivers are exposed to long solitary working hours, are prone to fatigue and sleep disturbances and report poor access to nutritious food when on the road <sup>[6, 7]</sup>. Short-haul drivers spend more time driving in high traffic areas and may experience greater time pressure to make multiple deliveries in a day <sup>[8]</sup>. Therefore, it is important to assess these driver types independently as the different demands, working conditions and risk factors they are subjected to can have a varying impact on their health <sup>[9]</sup>.

The industry also divides drivers into employee drivers and owner drivers. Owner drivers typically hire out and drive their own vehicle, providing a significant level of control over work-related factors such as scheduling, working hours and pay rates. Owner drivers are also responsible for the costs of operating the vehicle including fuel, repairs and maintenance. Employee drivers, on the other hand, are less likely to be directly responsible for maintenance and fuel costs, but tend to have less control over scheduling, types of loads carried and rates of pay <sup>[9]</sup>. Owner drivers are an under-researched group within the industry <sup>[10]</sup> and little is known about how different working conditions impact the health and performance of employee and owner drivers.

The majority of existing research into the health of drivers has been conducted outside of Australia <sup>[11]</sup>. While several studies have been conducted with Australian drivers, these have typically focused on safety <sup>[6, 7, 12]</sup>. One key aim of the Driving Health study was to generate data specific to the health of Australian drivers.

## **OBJECTIVES**

This sixth report describes the results from an online survey of a large sample of Australian truck drivers. Specifically, this phase of the study aimed to:

1. Characterise the physical and mental health of Australian truck drivers.
2. Identify the work, personal, social, environmental, regulatory and health determinants that influence health outcomes and driving performance.
3. Determine whether there are differences in the determinants of health and performance between long-haul and short-haul drivers, and between employee drivers and owner drivers.

## **Methods**

### **DATA SOURCES**

The online survey was designed to give an overview of the physical and mental health of drivers and the factors affecting their health and driving performance. In order to be completed by as many drivers as possible, the survey was delivered online and was designed to be completed in less than ten minutes. The survey was open from August 2019 to May 2020.

### **RECRUITMENT**

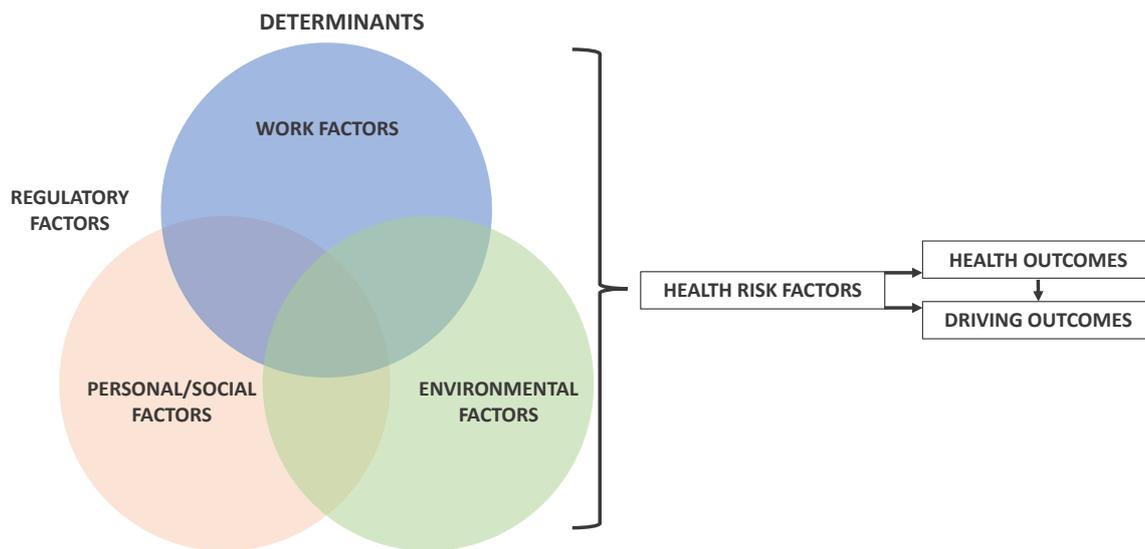
Participants were recruited via social media and study partner communication channels to complete a self-administered online survey using the Qualtrics Insight Platform. Linfox, Asia Pacific's largest privately-owned logistics company employing over 24,000 people, emailed employee drivers and subcontractors introducing the study and providing a link to the survey. The Transport Workers Union (TWU), promoted the survey using text messages, social media and emails to union members. The survey was also promoted at a TWU industry event for its members. The survey link was promoted to specific industry groups via Facebook and other social media channels, as well as industry-specific media inviting drivers to participate. Lastly, the Insurance Work and Health Group, alongside study partner the Centre for Work Health and Safety, promoted the survey through targeted paid advertisements on Facebook, focusing on reaching a broad distribution of age groups and driver types.

Drivers were eligible to participate if they were: a) Employed in a job involving the transport of goods in the 12 months prior to taking the survey, and b) Drove a vehicle for the main part of their job. Being able to complete the survey in English was a requirement to take part. Participants were excluded if they drove a car for their job but were included if they used any type of truck or van for the transport of goods.

Study methods were approved by the Monash University Human Research Ethics Committee, Project ID: 19191.

## MEASUREMENT

Using a Biopsychosocial approach, the Driving Health project adapted conceptual model described in the review by Crizzle et al <sup>[11]</sup> to examine the contribution of personal and social, work, environmental and health determinants contributing to injury and disease outcomes among Australian truck drivers. This conceptual model guided the identification of items to be included in the survey [Figure 1].



**Figure 1 Conceptual model for Driving Health, adapted from the review by Crizzle et al (2017)**

The survey was developed by the research team using standardised scales and study-specific items addressing areas identified as important by collaborators in the transport industry. Questions were designed to examine multiple areas of the study conceptual model, which was developed with representatives of the transport industry and based on a systematic review of determinants of health. The survey was piloted with a group of drivers to ensure the content was appropriate, was easily understood and could be completed within the ten-minute target time frame. Items were prioritised to address health and performance outcomes and a selection of determinants. A more complete list of items was developed for a subsequent telephone survey (not included in this report) to enable further exploration of determinants not captured in the online survey.

A summary of the determinants and outcomes captured in the online survey appear in [Table 1](#) and a copy of the survey is provided in [Appendix I](#).

**TABLE 1 DETERMINANTS AND OUTCOMES CAPTURED IN THE SURVEY**

<b>Determinants</b>		<b>Outcomes</b>	
<b>Personal factors</b>	Age	<b>Health</b>	Psychological distress
	Gender		General health
			Pain intensity
			Pain duration
			Health related quality of life (HrQOL)—utility score
			HrQOL—VAS score
<b>Work factors</b>	Experience	<b>Driving performance</b>	Crashes
	Payment type		Near misses
	Working hours		Work ability
	Employment type		
	Work type		
	Shift type		
	Vehicle type		
	Number of companies		
<b>Health Risk factors</b>	Body Mass Index (BMI)		
	Diagnosed health conditions		
	Number of diagnosed conditions		

**DETERMINANTS**

**Personal factors**

Personal factors refer to the characteristics and personal circumstances of the driver. The survey asked drivers their age and gender.

**Work factors**

Work factors refer to the driver’s working conditions and factors specific to professional driving. The survey included questions about driving experience, driving distance, employment type, payment type, shift type, working hours and the type of vehicle driven.

## HEALTH RISK FACTORS

Health risk factors refer to health conditions or other factors known to influence overall health. Drivers were asked to estimate their height and weight which enabled an estimation of their Body Mass Index (BMI), which was grouped into categories of under or normal weight, overweight and obese [13]. A list of specific diagnosed conditions was derived from the Australian National Health survey (NHS) [25] alongside previous Driving Health reports, and drivers were asked to identify conditions they had previously been diagnosed with. The number of reported conditions for each driver was summed to identify drivers with multiple health conditions.

## OUTCOMES

### Health

Health outcomes included psychological distress, general health, pain and health related quality of life (HrQOL). Psychological distress was measured using Kessler 6 (K6) psychological distress scale [14]. Self-reported general health was measured using the first question from the Short Form-12 (SF12) health survey.[15] Questions on pain duration and severity were reproduced from the Örebro Musculoskeletal Pain Questionnaire [16]. Health-related quality of life (HrQOL) was measured with the EuroQol-5D-5L questionnaire ([euroqol.org](http://euroqol.org)) containing 5 questions on mobility, personal care, usual activities, pain and anxiety/depression, and a visual-analogue-scale (VAS) to rate general health. The VAS score was also analysed separately as an indicator of general health.

Psychological distress was categorised as none or low (K6 score of 1-4), moderate (K6 score of 5-12) or severe (K6 score of  $\geq 13$ ) [17]. Self-rated general health categories were collapsed into Excellent/Very good, Good and Poor/Fair for comparison with the NHS [18]. The pain scale was converted into 4 categories, namely No pain (0), Mild (1-3), Moderate (4-6) and Severe (7-10) to describe pain intensity. Pain duration was defined as either <3 months, between 3-12 months and >12 months, both of the latter categories indicating chronic pain [19]. HrQOL, represented by utility scores, were calculated using an algorithm developed by Devlin et. al.[20] This algorithm was chosen since it has been used in the development of HrQOL normative values for an Australian population [21].

### Driving performance

Driving performance outcomes included the self-reported number of near misses experienced in the last month and the number of crashes in the last year. Work ability was determined by the first item from the Work Ability Index asking drivers to rate their work ability from 0 (“completely unable to work”) to 10 (“work ability at its best”) [22].

Near misses per week were collapsed into 3 categories namely: 0-5, representing an average of once a week, 6-10 and >10 per week. The number of crashes per year was dichotomised into yes (experienced a crash) or no (have not experienced a crash). The Work ability score was categorised and presented as poor (0-5), moderate (6-7), good (8-9) and excellent (10) [23].

## DRIVER CATEGORIES

In order to explore the differences in determinants and outcomes between driver types, four categories were identified. Based on survey responses, drivers were identified as either a long-haul or a short-haul driver, as well as an owner driver or an employee driver. A summary of driver categories is provided in [Table 2](#).

**TABLE 2 DEFINITION OF DRIVER CATEGORIES**

<b>Work type</b>	<b>Long-haul</b>	<b>Short-haul</b>
	Drivers travelling 500km or more in one shift	Drivers travelling less than 500km in one shift
<b>Employment type</b>	<b>Owner driver</b>	<b>Employee driver</b>
	Drivers that own the vehicle they drive for work	Drivers that do not own the vehicle they drive for work

## Data analysis

Data cleaning and analyses were conducted using IBM SPSS Statistics for Windows, Version 26 <sup>[24]</sup>. Variables that had groups with  $n < 20$  were collapsed into larger or “other” categories. Each item was assessed to determine the number of missing and/or “prefer not to say” responses. Missing responses typically indicated an incomplete survey (no recorded responses beyond the first missing response) and comprised  $\leq 3\%$  for each item. Therefore, surveys with missing responses were not included in further analysis. Participants with missing values in any of the health or driving performance outcome questions were excluded from the analysis.

Given the categorical nature of the data, counts and percentages were used to summarise driver demographic characteristics including age, driving experience, and work factors for all respondents. The characteristics of long- and short-haul drivers, and employee driver and owner drivers were also reported separately to enable comparisons between these types of drivers. The  $\chi^2$  statistic was used to determine statistical significance between group proportions. The general health VAS mean score was compared between driver groups using independent t-tests.

Health outcomes were compared to Australian population data where possible.

Psychological distress, self-rated general health and pain were compared to the National Health Survey data from 2017/2018 <sup>[25, 18, 26]</sup>. For HrQOL measures the measurements for a normative Australian population were derived from a study using a South Australian (SA) population <sup>[21]</sup>.

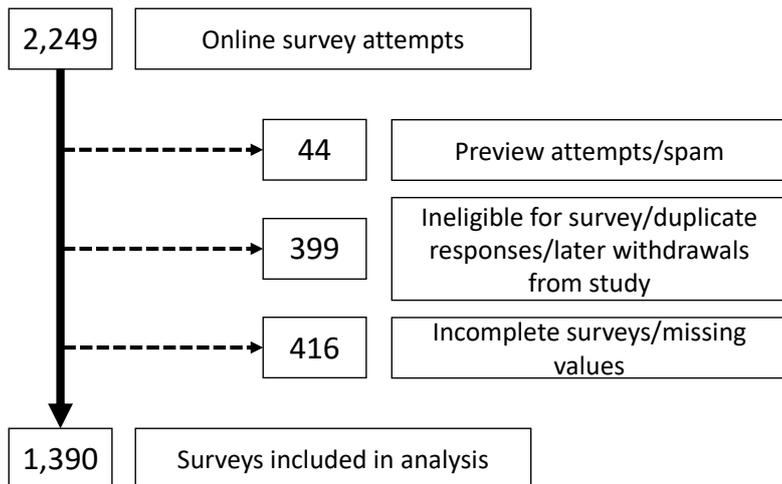
A 3-step regression analysis was performed to determine the effect of each determinant on the health and driving performance outcomes. First univariate regression was performed in order to determine the relationship between each of the determinants and outcomes. Next, a multivariate regression was created including variables significant at  $p < 0.2$  for each outcome. Finally, multivariate regression analyses were created for each outcome including independent variables found to be significant at  $p < 0.05$  in the preceding multivariate analysis. A test for multicollinearity between variables was conducted using the Variance Inflation Factor (VIF). All VIFs were below 2.5 and therefore not highly correlated <sup>[27]</sup>.

# Results

## Survey completion

The final sample for analysis consisted of 1,390 completed surveys.

The number of attempted surveys and reasons for surveys not being included in the analysis is provided in [Figure 2](#).



**Figure 2** Flow chart of survey responses

# Determinants

## Personal determinants

The majority of respondents were male (97.1%). Each age category was represented in relatively equal proportions with around 25% in each 10-year age group [Table 3]. The age distribution of drivers in the survey was consistent with labour force data from the Australian Bureau of Statistics (ABS), as was the proportion of males compared to females in our sample [28]. This indicates that our sample is a good representation of the driving workforce.

**TABLE 3 PERSONAL CHARACTERISTICS OF SURVEY RESPONDENTS**

	Whole cohort N=1390		Work Type				Employment type			
	n	%	Long-haul N=549 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190 (13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Age</b>										
<b>&lt; 35 years</b>	367	26.4%	141	25.7%	225	26.9%	42	22.2%	319	26.9%
<b>35–44 years</b>	273	19.6%	95	17.3%	177	21.2%	42	22.2%	231	19.5%
<b>45–55 years</b>	364	26.2%	153	27.9%	210	25.1%	52	27.5%	310	26.1%
<b>&gt; 55 years</b>	383	27.6%	159	29.0%	223	26.7%	53	28.0%	326	27.5%
<b>Gender</b>										
<b>Male</b>	1349	97.1%	531	97.4%	814	97.7%	185	98.4%	1152	97.5%
<b>Female</b>	33	2.4%	14	2.6%	19	2.3%	3	1.6%	30	2.5%

## Work determinants

The majority of drivers (85.5%) were employee drivers and more than half of the drivers were short-haul drivers (60.2%) [Table 4]. The ABS reported that nearly 14% of transport workers worked as independent contractors which is comparable to our sample of 13.7% owner drivers [28]. The employee/short-haul driver group (53%) represented the largest proportion of drivers in this survey, whereas the smallest category of drivers were owner/long-haul drivers (6%). In addition, only 183 drivers (13.2%) worked for more than one company. The survey was mostly completed by experienced drivers, with 41%

Flat rate (33.0%) and single time pay (30.0%) represented the most common form of payment for drivers, followed by kilometre rate (20.5%) and per trip/delivery (9.3%). A larger proportion of short-haul drivers received fat rate (40.4%) and single time pay (44.3%) ( $p < 0.001$ ), whereas more long-haul drivers were paid at a kilometre rate (48.4%) or per trip/delivery (14.2%) ( $p < 0.001$ ).

A larger proportion of owner drivers were paid per trip/delivery (32.4%) than employee drivers (5.8%) ( $p < 0.001$ ). However, 34.2% of employee drivers received single time pay compared to only 4.9% ( $p < 0.001$ ) of owner drivers.

**TABLE 4 WORK CHARACTERISTICS OF SURVEY RESPONDENTS**

	Work Type						Employment type			
	Whole cohort N=1390		Long-haul N=549 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190 (13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Experience</b>										
< 5 years	283	20.4%	91	16.6%	191	22.8%	29	15.3%	250	21.0%
5–20 years	533	38.3%	204	37.2%	328	39.2%	76	40.2%	455	38.3%
> 20 years	573	41.2%	253	46.2%	318	38.0%	84	44.4%	483	40.7%
<b>Payment type</b>										
Flat rate	459	33.0%	123	22.7%	335	40.4%	52	28.6%	404	34.2%
Single time pay	417	30.0%	48	8.8%	368	44.3%	9	4.9%	404	34.2%
Kilometre rate	285	20.5%	263	48.4%	22	2.7%	34	18.7%	248	21.0%
Per trip/delivery	129	9.3%	77	14.2%	52	6.3%	59	32.4%	69	5.8%
Other	86	6.2%	32	5.9%	53	6.4%	28	15.4%	57	4.8%
<b>Working hours per week</b>										
< 40	156	11.2%	38	7.0%	117	14.1%	27	14.4%	126	10.7%
41–60	700	50.4%	185	34.1%	513	61.8%	91	48.4%	605	51.4%
> 60	521	37.5%	320	58.9%	200	24.1%	70	37.2%	447	37.9%
<b>Shift type</b>										
Multiple trips between same location	789	56.8%	140	25.7%	647	78.0%	93	49.7%	689	58.4%
Single trip between 2 locations	334	24.0%	274	50.3%	60	7.2%	54	28.9%	277	23.5%
Multiple trips between 2 locations	255	18.3%	131	24.0%	122	14.7%	40	21.4%	214	18.1%

**TABLE 4 WORK CHARACTERISTICS OF SURVEY RESPONDENTS**

	Work Type						Employment type			
	Whole cohort N=1390		Long-haul N=549 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190 (13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Vehicle type</b>										
<b>B double</b>	451	32.4%	279	51.0%	171	20.5%	54	28.7%	395	33.3%
<b>Articulated truck</b>	432	31.1%	126	23.0%	305	36.5%	70	37.2%	359	30.3%
<b>Rigid truck</b>	291	20.9%	33	6.0%	257	30.8%	37	19.7%	250	21.1%
<b>Road train</b>	153	11.0%	105	19.2%	48	5.7%	10	5.3%	141	11.9%
<b>Other</b>	58	4.2%	4	0.7%	54	6.5%	17	9.0%	40	3.4%
<b>Working for more than one company</b>	183	13.2%	89	16%	93	11%	83	44%	98	8%

Half of the cohort (50.4%) reported working between 41-60 hours per week and 37.5% working over 60 hours per week. Only 11.2% of drivers reported working fewer than 40 hours per week. A larger proportion of long-haul drivers worked longer hours, with 58.9% indicating that they work over 60 hours a week, as opposed to 24.1% in short-haul drivers ( $p < 0.001$ ), with a larger proportion of short-haul drivers working less than 40 hours a week ( $p < 0.001$ ). The majority (61.8%) of short-haul drivers reported working between 41-59 hours per week ( $p < 0.001$ ). Owner and employee drivers had comparable work hours per week.

The most common format of working shift in this cohort was multiple trips between the same location or “home base” (56.8%), followed by a long single trip between two locations (24.0%). A large proportion of those working single trips were long-haul drivers with 50.3% identifying this as their regular shift type ( $p < 0.001$ ). As expected, more short-haul drivers drove multiple shifts between the same location (78.0%) ( $p < 0.001$ ). The percentage of employee drivers working multiple trips between the same location (58.4%) was greater than that of owner drivers (49.7%), however this was not statistically significant.

The most common type of vehicles driven by respondents were B double (32.4%) and articulated trucks (31.1%), followed by rigid trucks (20.9%) and road trains (11.0%). Most short-haul drivers drove articulated (36.5%) and rigid trucks (30.8%), whereas most long-haul drivers drove B double trucks (51.0%) and road trains (19.2%) ( $p < 0.001$ ). (A larger percentage of owner drivers (9.0%) used “Other” vehicles ( $p < 0.001$ ) (including vans and flatbed trucks), whereas more employee drivers drove road trains (11.9% vs 5.3%) ( $p < 0.05$ ).

## Health risk factors

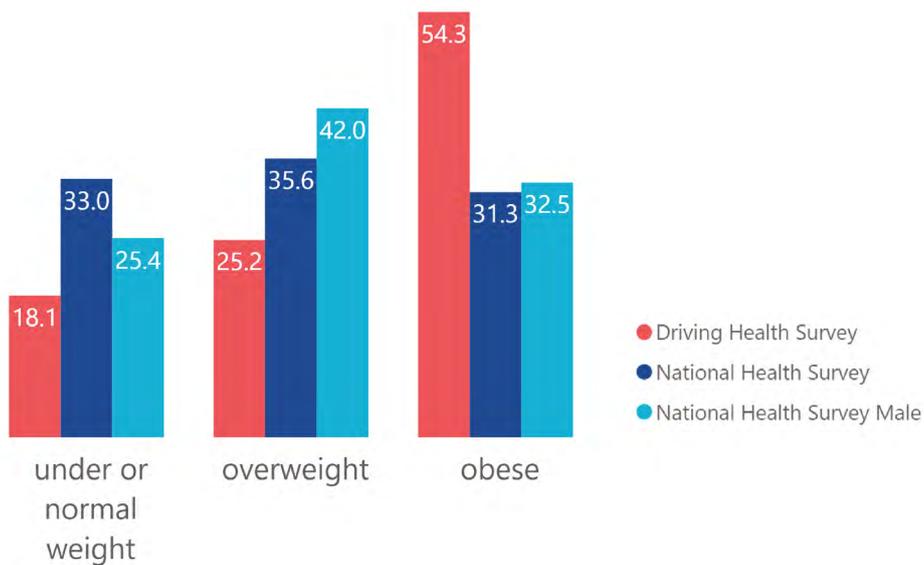
The BMI of drivers was calculated based on the answers to questions regarding height and weight. The majority of drivers were classified as overweight or obese, with over half (54.3%) categorised as obese and 25.2% as overweight [Table 5]. Using the 2017/2018 National Health Survey data [29], a much larger proportion of truck drivers were obese (54.3%) compared to Australian males (32.5%) [Figure 3]. Only 18.1% of the drivers fell within the normal weight range compared to 33.0% and 24.7% in Australian general population and males respectively. A larger proportion of long-haul drivers were obese (63.0%) compared to short-haul drivers (50.9%) ( $p < 0.01$ ). A similar trend was observed in owner and employee drivers with 47.8% and 56.9% classified as obese respectively, however this difference was not statistically significant.

**TABLE 5 HEALTH RISK FACTORS OF SURVEY RESPONDENTS**

	Work Type						Employment type			
	Whole cohort N=1390		Long-haul N=549 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190(13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Body Mass Index</b>										
<b>Under or normal weight</b>	252	18.1%	79	14.8%	173	21.1%	37	20.1%	212	18.3%
<b>Overweight</b>	350	25.2%	119	22.2%	229	28.0%	59	32.1%	288	24.8%
<b>Obese</b>	755	54.3%	337	63.0%	416	50.9%	88	47.8%	661	56.9%
<b>Diagnosed health conditions</b>										
<b>Back problems</b>	480	34.5%	193	35.2%	286	34.2%	65	34.2%	409	34.4%
<b>High blood pressure</b>	358	25.8%	137	25.0%	219	26.2%	44	23.2%	312	26.3%
<b>Mental health problems</b>	269	19.4%	112	20.4%	157	18.8%	29	15.3%	238	20.0%
<b>High cholesterol</b>	217	15.6%	80	14.6%	137	16.4%	26	13.7%	189	15.9%
<b>Arthritis</b>	209	15.0%	91	16.6%	118	14.1%	30	15.8%	176	14.8%
<b>Sleep apnoea</b>	186	13.4%	79	14.4%	107	12.8%	21	11.1%	164	13.8%
<b>Hay fever or allergic rhinitis</b>	174	12.5%	60	10.9%	114	13.6%	21	11.1%	152	12.8%
<b>Migraine/severe headaches</b>	162	11.7%	56	10.2%	106	12.7%	20	10.5%	142	12.0%
<b>Asthma</b>	141	10.1%	55	10.0%	86	10.3%	24	12.6%	116	9.8%

**TABLE 5 HEALTH RISK FACTORS OF SURVEY RESPONDENTS**

	Work Type						Employment type			
	Whole cohort N=1390		Long-haul N=549 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190(13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Diabetes</b>	114	8.2%	48	8.7%	66	7.9%	13	6.8%	100	8.4%
<b>Traumatic injury or accident</b>	81	5.8%	29	5.3%	52	6.2%	11	5.8%	70	5.9%
<b>Cardiovascular disease</b>	74	5.3%	32	5.8%	42	5.0%	8	4.2%	65	5.5%
<b>Cancer</b>	41	2.9%	21	3.8%	20	2.4%	6	3.2%	33	2.8%
<b>Osteoporosis or osteopenia</b>	33	2.4%	9	1.6%	24	2.9%	5	2.6%	27	2.3%
<b>COPD</b>	24	1.7%	14	2.6%	10	1.2%	2	1.1%	22	1.9%
<b>Cerebrovascular disease/stroke</b>	11	0.8%	7	1.3%	4	0.5%	1	0.5%	10	0.8%
<b>Number of diagnosed health conditions</b>										
<b>No conditions</b>	346	24.9%	133	24.7%	212	25.7%	60	32.4%	282	24.1%
<b>One condition</b>	364	26.2%	139	25.8%	222	26.9%	49	26.5%	313	26.7%
<b>2 conditions</b>	248	17.8%	102	18.9%	146	17.7%	26	14.1%	219	18.7%
<b>3 or more conditions</b>	410	29.5%	165	30.6%	245	29.7%	50	27.0%	357	30.5%

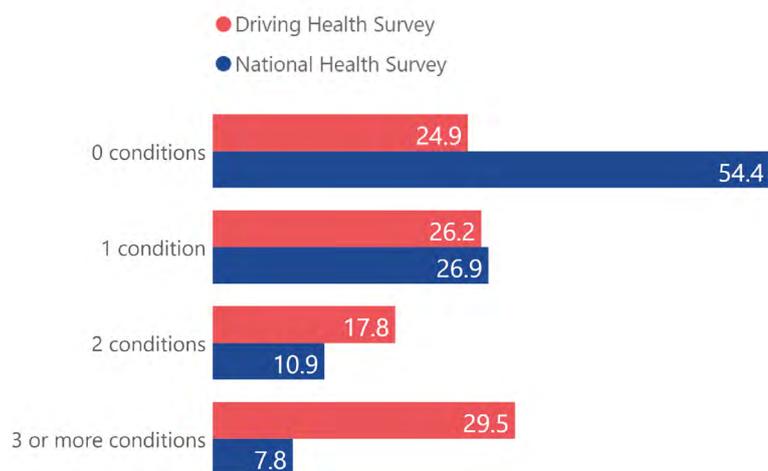


**Figure 3 BMI in truck drivers vs general (NHS) population (%)**

Over a third of drivers reported receiving a diagnosis of back problems (34.5%) and high blood pressure (25.8%). Mental health problems, such as depression and anxiety, were also common with 19.4% receiving a diagnosis in the last year. There were no appreciable differences in the health conditions diagnosed between long- and short-haul drivers. Similarly, owner and employee drivers had comparable distribution of diagnosed health conditions.

Almost a third of the drivers completing the survey (29.5%) reported being diagnosed with more than two of the health conditions listed, compared to 7.8% of the general population (NHS)<sup>[25]</sup> [Figure 4].

There was no significant difference in the number of diagnosed conditions between long- and short-haul drivers or owner and employee drivers.



**Figure 4 Number of diagnosed health conditions in truck drivers vs general (NHS) population (%)**

# Outcomes

## Health

**TABLE 6 HEALTH OUTCOMES OF SURVEY RESPONDENTS**

	Work Type						Employment type			
	Whole cohort N=1390		Long-haul N= 49 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190 (13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Psychological distress</b>										
<b>None or low</b>	695	50.0%	296	53.9%	397	47.4%	107	56.3%	582	49.0%
<b>Moderate</b>	510	36.7%	196	35.7%	313	37.4%	60	31.6%	444	37.4%
<b>Severe</b>	185	13.3%	57	10.4%	127	15.2%	23	12.1%	162	13.6%
<b>General Health</b>										
<b>Very good/ Excellent</b>	437	31.4%	169	30.8%	268	32.0%	73	38.4%	360	30.3%
<b>Good</b>	538	38.7%	212	38.6%	323	38.6%	72	37.9%	461	38.8%
<b>Poor/Fair</b>	415	29.9%	168	30.6%	246	29.4%	45	23.7%	367	30.9%
<b>Pain—intensity</b>										
<b>None</b>	523	37.6%	198	36.1%	324	38.7%	77	40.5%	440	37.0%
<b>Mild</b>	321	23.1%	116	21.1%	203	24.3%	46	24.2%	273	23.0%
<b>Moderate</b>	398	28.6%	172	31.3%	225	26.9%	48	25.3%	346	29.1%
<b>Severe</b>	148	10.6%	63	11.5%	85	10.2%	19	10.0%	129	10.9%
<b>Pain—duration</b>										
<b>&lt; 3 months</b>	245	17.6%	80	14.7%	164	19.7%	27	14.2%	216	18.3%
<b>3—12 months</b>	131	9.4%	50	9.2%	81	9.7%	12	6.3%	119	10.1%
<b>&gt; 12 months</b>	482	34.7%	218	40.0%	262	31.5%	74	38.9%	404	34.3%
<b>Health related quality of life</b>	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
<b>Utility score</b>	0.83	0.16	0.83	0.17	0.84	0.16	0.85	0.17	0.83	0.16
<b>EQ-VAS scale score</b>	72.2	19.8	72.0	20.5	72.4	19.4	73.9	19.6	71.9	19.9

## Psychological distress

Half of the drivers reported having no or low psychological distress (50.0%), whereas 13.3% and 36.7% were experiencing severe and moderate psychological distress respectively [Table 6]. A greater percentage of short-haul (15.2%) drivers had severe psychological distress relative to their long-haul (10.4%) driver counterparts ( $p < 0.05$ ).

### DRIVER PSYCHOLOGICAL DISTRESS COMPARED TO THE POPULATION

When compared to Australian population data captured in the National Health Survey from 2017/2018<sup>[26]</sup>, a larger proportion of younger drivers (< 35 years) reported high levels of psychological distress (21.8%) than males (12.0%) and the general population (14.2%) of the same age [Figure 5].

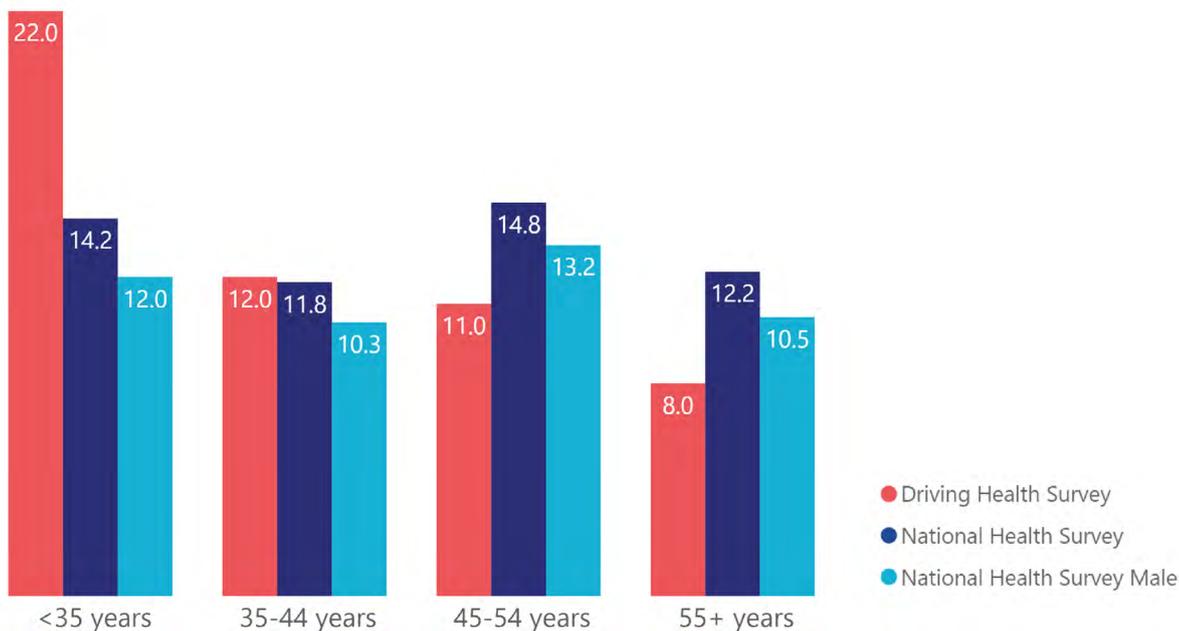
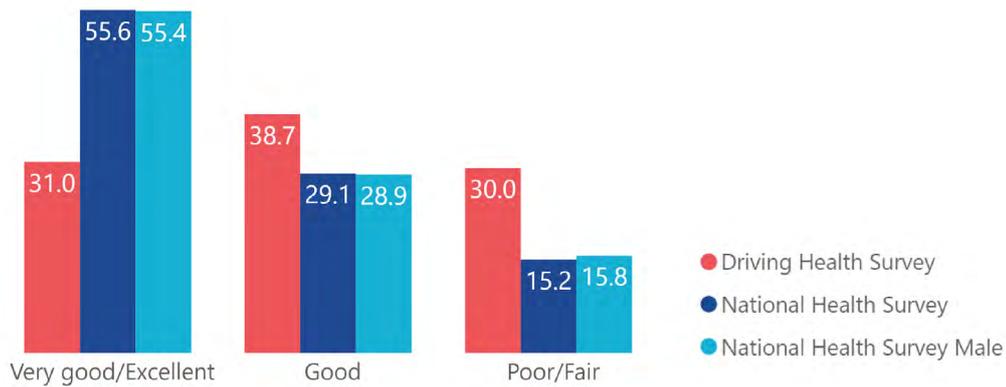


Figure 5 Severe psychological distress in truck drivers vs general (NHS) population by age (%)

Approximately two thirds of drivers reported being in either excellent to very good (31.4%) or good (38.7%) health [Table 6]. There were no differences in self-rated health between long- and short-haul drivers, however a greater proportion of owner drivers reported very good health (38.4%) compared to employee drivers (30.3%) ( $p < 0.05$ ).

### DRIVER GENERAL HEALTH COMPARED TO THE POPULATION

The proportion of drivers rating themselves as being in poor/fair general (29.9%) health was double that of the general Australian population (15.2%) and for males (15.8%) reported in the 2017/18 NHS<sup>[18]</sup> [Figure 6]. Truck drivers appear to have poorer general health compared to the general population.



**Figure 6 General health of truck drivers vs NHS population**

## Pain

Over two thirds (62.3%) experienced mild (23.1%), moderate (28.6%) and severe (10.6%) levels of pain in the week prior to the survey [Table 6], and the remaining 37.6% did not experience any pain. The majority of drivers experiencing pain at any level had chronic pain lasting longer than three months (71.4% of those with pain). There were no differences in pain severity between driver types, however a larger proportion of long-haul drivers reported pain lasting for more than 12 months (40.0%) compared to short-haul drivers (31.5%) ( $p < 0.01$ ).

### DRIVER PAIN COMPARED TO THE GENERAL POPULATION

The proportion of drivers reporting severe to very severe levels of pain (10.6%) was higher than the 7.2% reported for the general Australian population<sup>[25]</sup>. Drivers appear to have greater levels of pain than the general population.

## Health-related quality of life

Health-related quality of life (HrQOL) scores start at 1 representing perfect health with lower scores representing progressively poorer health. The mean (SD) HrQOL score for all truck drivers was 0.83 (0.16) [Table 6]. The EQ-VAS scale provides a rating of self-perceived health scored from 0 (worst possible health) to 100 (best possible health). Truck drivers had a mean (SD) EQ-VAS score of 72.2 (19.9). There were no differences between scores for either of the quality of life measures across the driver types.

### DRIVER HEALTH RELATED QUALITY OF LIFE COMPARED TO THE GENERAL POPULATION

The mean (SD) HrQOL score for drivers of 0.83 (0.16) was significantly lower than the mean (SD) score of a normative South Australian (SA) population of 0.91 (0.14) ( $t=15.9$ ,  $p < 0.001$ ) as well as the mean score (SD) of males from this population of 0.92 (0.13)<sup>[21]</sup> [Table 7]. Truck drivers had a mean (SD) HrQOL VAS score of 72.2 (19.8) which was significantly lower than the SA whole (mean 78.6, SD 16.6) and male population (mean 79.9, SD 15.7) (both  $p < 0.001$ ) [Table 7]. Truck drivers appear to have a lower health related quality of life than the general population.

**TABLE 7 COMPARISON OF DRIVER HRQOL SCORES WITH POPULATION SCORES**

	HrQOL utility score		Comparison		HrQOL VAS score		Comparison	
	Mean	SD	t	p	Mean	SD	t	p
<b>Surveyed drivers</b>	0.83	0.16			72.2	19.9		
<b>SA* whole population</b>	0.91	0.14	15.9	< 0.001	78.6	16.6	10.3	< 0.001
<b>SA* male population</b>	0.92	0.13	16.3	< 0.001	78.9	15.7	9.8	< 0.001

\*SA whole and male population represents normative population values derived from McCaffrey et. al.<sup>[21]</sup>.

Higher HrQOL and VAS score reflects better health state

HrQOL: Health related quality of life; VAS: Visual analogue scale; SD standard deviation; t: t statistic

# Driving performance

**TABLE 8 DRIVING PERFORMANCE OUTCOMES FOR DRIVERS**

	Work Type						Employment type			
	Whole cohort N=1390		Long-haul N=549 (39.5%)		Short-haul N=837 (60.2%)		Owner driver N=190 (13.7%)		Employee driver N=1188 (85.5%)	
	n	%	n	%	n	%	n	%	n	%
<b>Experienced crash in the last year</b>										
	181	13.0%	59	10.7%	121	14.5%	19	10.0%	162	13.7%
<b>Near misses</b>										
<b>Once per week (0–5/week)</b>	997	71.7%	391	72.1%	603	74.1%	141	76.6%	844	72.5%
<b>Daily (6–10/week)</b>	168	12.1%	65	12.0%	103	12.7%	19	10.3%	149	12.8%
<b>&gt; 10/week</b>	195	14.0%	86	15.9%	108	13.3%	24	13.0%	171	14.7%
<b>Work Ability</b>										
<b>Poor</b>	200	14.4%	85	15.5%	115	13.7%	27	14.2%	172	14.5%
<b>Moderate</b>	232	16.7%	82	14.9%	148	17.7%	33	17.4%	199	16.8%
<b>Good</b>	565	40.6%	217	39.5%	346	41.3%	77	40.5%	480	40.4%
<b>Excellent</b>	393	28.3%	165	30.1%	228	27.2%	53	27.9%	337	28.4%

## Crashes and near misses

Crashes were relatively rare with only 181 (13.0%) of drivers saying they had experienced a crash in the previous 12 months [Table 8]. More short-haul drivers reported a crash (14.5%) than long-haul drivers (10.7%) ( $p < 0.05$ ).

Near misses were more common than crashes, with 71.7% of drivers experiencing a near miss on average once per week. Twelve percent and 14.0% of drivers reported experiencing 6-10 and more than 10 near misses a week respectively. There was no difference in the frequency of near misses between driver types.

## Work ability

The majority of drivers completing the survey rated themselves as having good (41%) or excellent (28%) work ability [Table 8]. There were no differences in work ability across driver types.

# Impact of determinants on outcomes

Multivariate modelling was used to determine which determinants, when all considered together, impair or improve the health and performance outcomes measured. The tables presented below describe determinants found significant in the final models. Full details of each multivariate model is provided in [Appendix II](#).

## Psychological distress

Younger age, long working hours, vehicle type and number of diagnosed health conditions were found to be associated with reporting severe psychological distress [Table 9]. Drivers under 35 years had 4.28 (95% CI 3.13-5.87) times higher odds of reporting severe psychological distress than those over the age of 55. Drivers of “Other” vehicle types, such as a flatbed truck or van, had twice the odds (OR 2.06, 95% CI 1.19-3.58) of reporting severe psychological distress than rigid truck drivers. Drivers working either less than 40 hours/week (OR 0.46, 95%CI 0.30-0.69) or between 41-60 hours/week (OR 0.76, 95% CI 0.59-0.98) had significantly lower odds of suffering severe psychological distress compared to those working over 60 hours/week. Relative to drivers with no conditions, the odds of having severe psychological distress nearly doubled with each diagnosed health condition. As such, the odds of having severe psychological distress was 8.28 (95% CI 5.99-11.44) times higher in drivers with 3 or more diagnosed conditions.

**TABLE 9 DETERMINANTS IDENTIFIED AS SIGNIFICANT PREDICTORS OF SEVERE PSYCHOLOGICAL DISTRESS**

		Final multivariate model			
		OR	95% CI		p
Gender	Male				
	Female				
Age	< 35 years	4.28	3.13	5.87	< 0.001
	35–44 years	1.91	1.37	2.67	< 0.001
	45–54 years	1.72	1.27	2.34	< 0.001
	> 55 years	1			
Work type	Short-haul	1.54	1.18	1.99	< 0.01
	Long-haul	1			

**TABLE 9 DETERMINANTS IDENTIFIED AS SIGNIFICANT PREDICTORS OF SEVERE PSYCHOLOGICAL DISTRESS**

		Final multivariate model			
		OR	95% CI		p
<b>Vehicle type</b>	<b>Other</b>	2.06	1.19	3.58	<b>0.01</b>
	<b>Road train</b>	0.81	0.53	1.26	0.35
	<b>B Double</b>	0.84	0.6	1.17	0.3
	<b>Articulated truck</b>	0.93	0.68	1.27	0.64
	<b>Rigid truck</b>	1			
<b>Working hours</b>	<b>≤ 40hrs</b>	0.46	0.3	0.69	<b>&lt; 0.001</b>
	<b>41 – 60 hrs</b>	0.76	0.59	0.98	<b>0.03</b>
	<b>&gt; 60 hrs</b>	1			
<b>Diagnosed conditions</b>	<b>One condition</b>	2.28	1.65	3.14	<b>&lt; 0.001</b>
	<b>2 conditions</b>	3.65	2.57	5.18	<b>&lt; 0.001</b>
	<b>3 + conditions</b>	8.28	5.99	11.44	<b>&lt; 0.001</b>
	<b>No conditions</b>	1			

## Self-reported general health

Working hours, BMI and number of diagnosed conditions were found to be associated with poorer general health. Drivers had 0.65 (95% CI 0.45-0.92) lower odds of poor general health if they worked  $\leq 40$  hours a week [Table 10]. Similarly, having a lower BMI and being classified as under or normal weight (OR.37, 95% CI 0.28-0.49) or overweight (OR 0.61, 95% CI 0.47-0.78), resulted in significantly reduced odds of being in poor health compared to obese drivers. Having one diagnosed condition increased the odds of being in poor health by 2.59 times (95% CI 1.95-3.44), 4.02 times 95% CI 2.94-5.50) for 2 conditions and 7.98 times (95% CI 5.99-10.62) for 3 or more conditions.

**TABLE 10 DETERMINANTS IDENTIFIED AS SIGNIFICANT PREDICTORS OF POOR GENERAL HEALTH**

		Final multivariate			
		OR	95% CI		p
<b>Working hours</b>	<b><math>\leq 40</math>hrs</b>	0.65	0.45	0.92	<b>0.02</b>
	<b>41–60 hrs</b>	1.00	0.80	1.25	0.98
	<b>&gt; 60 hrs</b>	1.00			
<b>BMI</b>	<b>Under or normal weight</b>	0.37	0.28	0.49	<b>&lt; 0.001</b>
	<b>Overweight</b>	0.61	0.47	0.78	<b>&lt; 0.001</b>
	<b>Obese</b>	1.00			
<b>Diagnosed conditions</b>	<b>One condition</b>	2.26	1.69	3.04	<b>&lt; 0.001</b>
	<b>2 conditions</b>	3.89	2.81	5.38	<b>&lt; 0.001</b>
	<b>3 or more conditions</b>	8.04	5.92	10.91	<b>&lt; 0.001</b>
	<b>No conditions</b>				

## Pain severity and duration

The odds of a driver suffering from severe or chronic pain increased significantly with the number of diagnosed health conditions. Drivers with 3 or more diagnosed health conditions were 7.98 (95% CI 5.99-10.62) and 7.69 (95% CI 5.77-10.26) times the odds more likely to have severe pain and pain lasting over a year respectively, than those with no diagnosed health conditions. No other determinants were significant predictors of pain outcomes.

## Health-related quality of life

Working hours and the number of diagnosed conditions were related to the health utility score of drivers [Table 11]. Drivers with 1 condition (OR 0.94, 95% CI 0.92-0.96), 2 conditions (OR 0.92, 95% CI 0.81-0.84) and 3 or more conditions (OR 0.82, 95% CI 0.81-0.84) all had reduced odds of having a higher health utility scores relative to drivers with no conditions. Working less than 60 hours a week was associated with significantly increased odds of having a higher utility score. Working less than 40 hours/week and between 40-60 hours/week resulted in 1.05 (95% CI 1.02-1.08) and 1.02 (95% CI 1.00-1.04) increased odds respectively of having a higher utility score and therefore better quality of life.

**TABLE 11 DETERMINANTS IDENTIFIED AS SIGNIFICANT PREDICTORS OF HIGH HEALTH-RELATED QUALITY OF LIFE SCORE**

		Final multivariate model			
		OR	95% CI		p
<b>Vehicle type</b>	<b>Other</b>	0.96	0.93	1.01	0.09
	<b>Road train</b>	1.02	0.99	1.05	0.14
	<b>B Double</b>	1.01	0.99	1.03	0.38
	<b>Articulated truck</b>	1.02	0.99	1.04	0.16
	<b>Rigid truck</b>	1			
<b>Working hours</b>	<b>≤ 40hrs</b>	1.05	1.02	1.08	< 0.01
	<b>41–60 hrs</b>	1.02	1.00	1.04	< 0.01
	<b>&gt; 60 hrs</b>	1			
<b>Diagnosed conditions</b>	<b>One condition</b>	0.94	0.92	0.96	< 0.001
	<b>2 conditions</b>	0.90	0.87	0.92	< 0.001
	<b>3+ conditions</b>	0.82	0.81	0.84	< 0.001
	<b>No conditions</b>	1			

## Crashes

Reported crashes were relatively rare in this cohort and the only factor significantly associated with increased odds of experiencing a crash in the last year was being diagnosed with 3 or more health conditions (OR 1.77, 95% CI, 1.13-2.78).

## Near misses

Age, increased working hours/week and number of diagnosed conditions were significantly associated with higher odds of experiencing more than 10 misses per week [Table 12]. Drivers with 3 or more diagnosed conditions had 2.94 (95% CI 2.06-4.20) higher odds compared to those with no conditions. As expected, working fewer hours per week decreased the odds of near misses in both drivers working between 41-60 hours/week (OR 0.66, 95% CI 0.51-0.86) and those working less than 40 hours/week (OR 0.45, 95% CI 0.27-0.73).

**TABLE 12 DETERMINANTS IDENTIFIED AS SIGNIFICANT PREDICTORS OF EXPERIENCING > 10 NEAR MISSES / WEEK**

		Final multivariate model			
		OR	95% CI		p
<b>Gender</b>	<b>Male</b>				
	<b>Female</b>				
<b>Age</b>	<b>&lt; 35 years</b>	3.28	2.30	4.67	< 0.001
	<b>35–44 years</b>	2.07	1.42	3.04	< 0.001
	<b>45–54 years</b>	1.27	0.88	1.84	0.21
	<b>&gt; 55 years</b>	1			
<b>Working hours</b>	<b>≤ 40hrs</b>	0.45	0.27	0.73	< 0.01
	<b>41–60 hrs</b>	0.66	0.51	0.86	< 0.01
	<b>&gt; 60 hrs</b>	1			
<b>Diagnosed conditions</b>	<b>One condition</b>	1.69	1.17	2.44	< 0.01
	<b>2 conditions</b>	1.60	1.06	2.40	0.03
	<b>3 + conditions</b>	2.94	2.06	4.20	< 0.001
	<b>No conditions</b>	1			

## Work ability

The type of vehicle driver, BMI and number of diagnosed conditions all had a significant impact on work ability [Table 13]. Articulated (OR 0.75, 95% CI 0.57-0.99) and B double (OR 0.59, 95% CI 0.45-0.79) truck drivers both had decreased odds of reporting poor work ability compared to rigid truck drivers. The respective odds of reporting poor work ability were 0.66 (95% CI 0.50-0.87) and 0.71 (95% CI 0.56-0.91) in drivers with normal or overweight BMI ranges relative to obese drivers. Lastly, having more diagnosed conditions increased the odds of having poor work ability by 1.99 (95% CI 1.50-2.64) in drivers with one condition, 3.14 (95% CI 2.28-4.32) with 2 conditions and 6.40 (95% CI 4.77-8.59) in drivers with 3 or more conditions.

**TABLE 13 DETERMINANTS IDENTIFIED AS SIGNIFICANT PREDICTORS OF POOR WORK ABILITY**

		Final multivariate model			
		OR	95% CI		p
Gender	Male				
	Female				
Age	< 35 years	1.37	1.04	1.80	0.03
	35–44 years	0.98	0.72	1.33	0.90
	45–54 years	0.91	0.69	1.19	0.49
	> 55 years	1			
Vehicle type	Other	1.45	0.85	2.49	0.17
	Road train	0.86	0.59	1.25	0.43
	B Double	0.59	0.45	0.79	< 0.001
	Articulated truck	0.75	0.57	0.99	0.04
	Rigid truck	1			
BMI	Under or normal weight	0.66	0.50	0.87	< 0.01
	Overweight	0.71	0.56	0.91	0.01
	Obese	1			
Diagnosed conditions	One condition	1.99	1.50	2.64	< 0.001
	2 conditions	3.14	2.28	4.32	< 0.001
	3 or more conditions	6.40	4.77	8.59	< 0.001
	No conditions	1			

# Discussion

To our knowledge, this is the largest survey of the physical and mental health of Australian professional drivers. This report describes Australian truck drivers' demographic characteristics, overall physical and psychological status and driving performance, comparing long-haul drivers to short-haul drivers, and owner drivers to employee drivers. This report also describes how the work, personal and social factors captured influence health and driving performance.

This survey characterises the physical health of truck drivers as poorer than the average for Australians. Over 80% of truck drivers in our study were classified as being overweight or obese compared to the average of 70% for Australian males<sup>[29]</sup>. Comparable prevalence rates of obesity have been reported on for truck drivers in the United States of America, Canada and Australia<sup>[30, 31, 32, 33]</sup>. It is widely acknowledged that obesity is associated with a series of health problems such as type 2 diabetes, high blood pressure and stroke<sup>[34, 35]</sup>. In our survey, more drivers had been diagnosed with an ongoing health condition than the average for Australian men, and the rate of drivers having 3 or more conditions was almost four times the rate of the Australian population. Back problems were the most common condition reported in our sample of truck drivers, and appeared to be double the prevalence rates of back problems for Australian males<sup>[25]</sup>. This result aligns with the Driving Health study report 2 in that musculoskeletal injury was the most common type of work-related injury for Australian truck drivers<sup>[2]</sup>. These factors, alongside the high prevalence of severe and long-standing pain, paint a picture of poor physical health in truck drivers.

Characterising mental health is somewhat more nuanced. The prevalence of diagnosed mental health conditions in our sample appears to be consistent with the average among Australian males<sup>[25]</sup>. However, we found that 1 in 2 drivers surveyed reported some level of psychological distress, and that the proportion of truck drivers under 35 with severe psychological distress was almost double that of the average for Australian males in the same age bracket<sup>[25]</sup>. Beyond the age of 45 the prevalence of severe psychological distress in our survey sample was below the average reported for the Australian male population. One explanation for the lower incidence of severe distress in older drivers could be that drivers who have managed to remain in the occupation for a long time have been successful in identifying coping strategies to deal with the psychological strain of being a truck driver. Older drivers have been found to self-regulate their behaviour to compensate for decline in their physical and cognitive abilities, however it is unclear whether self-regulation extends to psychological distress<sup>[36]</sup>. A further explanation could relate to changing parental responsibilities with age, as younger drivers are more likely to be juggling a young family and work responsibilities. However, the industry cannot rely on younger drivers finding their own coping strategies without support. Driving Health report number 5 demonstrated that for drivers under the age of 40 suicide was a leading cause of death, second only to external causes of injury, such as crashes<sup>[5]</sup>.

Australia is at risk of a shortage of truck drivers in the future, in part due to difficulty attracting young drivers to the profession <sup>[37]</sup> and must take steps to protect younger drivers' mental health. Future initiatives to address the mental health of drivers, such as those proposed by Healthy Heads in Trucks and Sheds ([healthyheads.org.au](http://healthyheads.org.au)) and Steering Healthy Minds ([steeringhealthyminds.com.au](http://steeringhealthyminds.com.au)), should not only address the capacity of drivers to cope with the stresses of the job, but also aim to reduce the psychological strain placed on drivers. Consultation with older drivers will help to better understand these results and determine if their strategies to deal with stresses at work could be used to help younger drivers.

In this survey the number of chronic conditions reported by drivers was a significant predictor of not only health outcomes, but also driving performance outcomes and self-rated work ability. While the significance of having multiple chronic conditions is not surprising when considering general health and health related quality of life, having three or more chronic conditions approached doubling the odds of experiencing a crash. The consequences of a crash are potentially catastrophic, yet they only represent a small proportion of the burden of injury and illness for drivers <sup>[2]</sup>. Not only is the management of chronic health conditions of high importance for drivers, so are preventative efforts to reduce the risk of drivers developing multiple health conditions. Eating a healthy diet and getting regular exercise are the basis of prevention for many chronic conditions such as diabetes, mental health and cardiovascular diseases <sup>[38, 39, 40]</sup>. However, the long hours on the road reported in this survey impact access to fresh food <sup>[41]</sup> and the opportunity to exercise <sup>[32]</sup>. Unpredictable work shifts and working through the night mean that accessing a health professional can be a challenge <sup>[30]</sup>. The majority of drivers completing this survey were employee drivers rather than owner drivers, suggesting there may be a role to play for employers to devote increased resources to driver health and wellbeing. Helping drivers to be healthy and stay healthy at work will not only benefit employees, but will likely improve their performance at work as well.

Other determinants observed as consistent predictors of the outcomes measured were the number of hours worked and age. In line with a previous study on work health and safety in the Australian road freight transport industry <sup>[12]</sup>, nearly two fifths of participants in our survey worked over 60 hours per week. Our findings suggest that working long hours puts Australian truck drivers at greater risk of poorer mental and physical health, while exposing drivers to a greater likelihood of near misses at work. To date, most state governments have tightened the working hour regulations for commercial vehicle driving, requiring drivers to have longer rests at night and shorter daily work hours <sup>[42]</sup>. While aiming to improve safety in the industry, Driving Health report number 7 describes some of the impact these regulations have on drivers who are left to balance the pressures of delivering on time whilst adhering to mandated rest periods. In a series of interviews with drivers, it was suggested that experienced drivers were able to manage their own fatigue levels <sup>[43]</sup>. In our survey, being experienced led to fewer near misses and was a protective factor against psychological distress.

Being a short-haul driver increased the likelihood of high levels of psychological distress, and was the only difference between the driver groups retained in multivariate analysis. One explanation for this is the larger proportion of time spent in stressful metropolitan road traffic conditions and more frequent interaction with the general public on the road <sup>[42]</sup>. It could also be the case that long-haul drivers' increased ability to be able to plan when and where to stop provides a level of autonomy that leads benefits in mental health <sup>[44]</sup>.

The differences found between long- and short-haul drivers related to obesity, pain duration and crashes were not large enough for work type to remain a significant predictor of the outcomes examined. Owner drivers were more likely to report very good health when compared to employee drivers, but being an owner-driver or an employee driver was not significant in any of the modelled outcomes. These results suggest that the physical health challenges are similar for drivers regardless of the distances driven or employee status, however interventions to address mental health may need to be different for short-haul drivers compared to long-haul drivers. However, owner-drivers made up just less than 14% of our survey sample so further engagement with owners may be required when designing interventions to improve owner driver health.

## **STRENGTHS & LIMITATIONS**

This study presents data from one of the largest health focused surveys of truck drivers in Australia. Our sample includes drivers from all over Australia who drive a wide range of vehicles across various experience levels. However, there are some limitations in this study to be noted. While the recruitment approach included direct email, presenting at industry events and utilising various industry and social media channels, using these approaches is likely to bias the sample towards drivers possessing the technological skills to easily access and complete the survey. Despite this, comparison of the sample with workforce statistics suggests it is representative of the driving workforce <sup>[28]</sup>. Delivering the survey online simplified recruitment and distribution of the survey to a wider range and larger number of drivers than would have been otherwise possible. At forming around 14% of the sample, owner drivers could be considered to be underrepresented in the data. However, the proportion of owner drivers is similar to industry estimates <sup>[28]</sup>. The data in the survey relies largely on self-reporting and may be influenced by the narrative and memory of the drivers themselves. The application of validated measures such as the Kessler 6 aimed to reduce the impact of recall bias on the findings. Finally, as a cross-sectional survey these results should not be used as a basis for establishing causal relationships, but rather should be used to highlight areas for further investigation.

# Summary & Conclusions

The profile of physical health of truck drivers in Australia is poor. Truck drivers are more likely to be overweight, report poor general health and be diagnosed with multiple chronic health conditions compared to the rest of the population. The profile of mental health is poorer for drivers under 35, but better for drivers over 45 when compared to rest of the population. Having multiple chronic health conditions was a strong and consistent predictor of health, work performance and self-reported work ability. Drivers work long hours, putting them at further risk of poor mental and physical health. The health challenges are similar across work and employment types for drivers, with the exception of short-haul drivers being at greater risk of high levels of psychological distress.

This study provides useful baseline data that establish a health profile of Australian truck drivers. It highlights the need for mental health interventions, particularly for younger drivers, and interventions targeted towards the prevention and management of chronic health conditions, in order to help drivers be healthy and stay healthy at work. Future work in this area will examine the contribution of a wider range of work, personal, environmental and regulatory factors to driver health.

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# Appendix I

## Driving Health Survey

Please read the study information in the **Driving Health explanatory statement**

Additional information about this study can be found on our [drivinghealth.net](http://drivinghealth.net).

Please indicate if you agree to participate in the research study under the following conditions:

- I have **read** the study information and understand the purpose and nature of this study.
- I am participating **voluntarily**.
- I understand that all information provided will be treated as **confidential**.
- I understand that all information provided will be treated as confidential, available only to the Monash University Research team and **not shared** with Linfox.

- Yes
  - No
- 

### First, we need to know if you are eligible for this study.

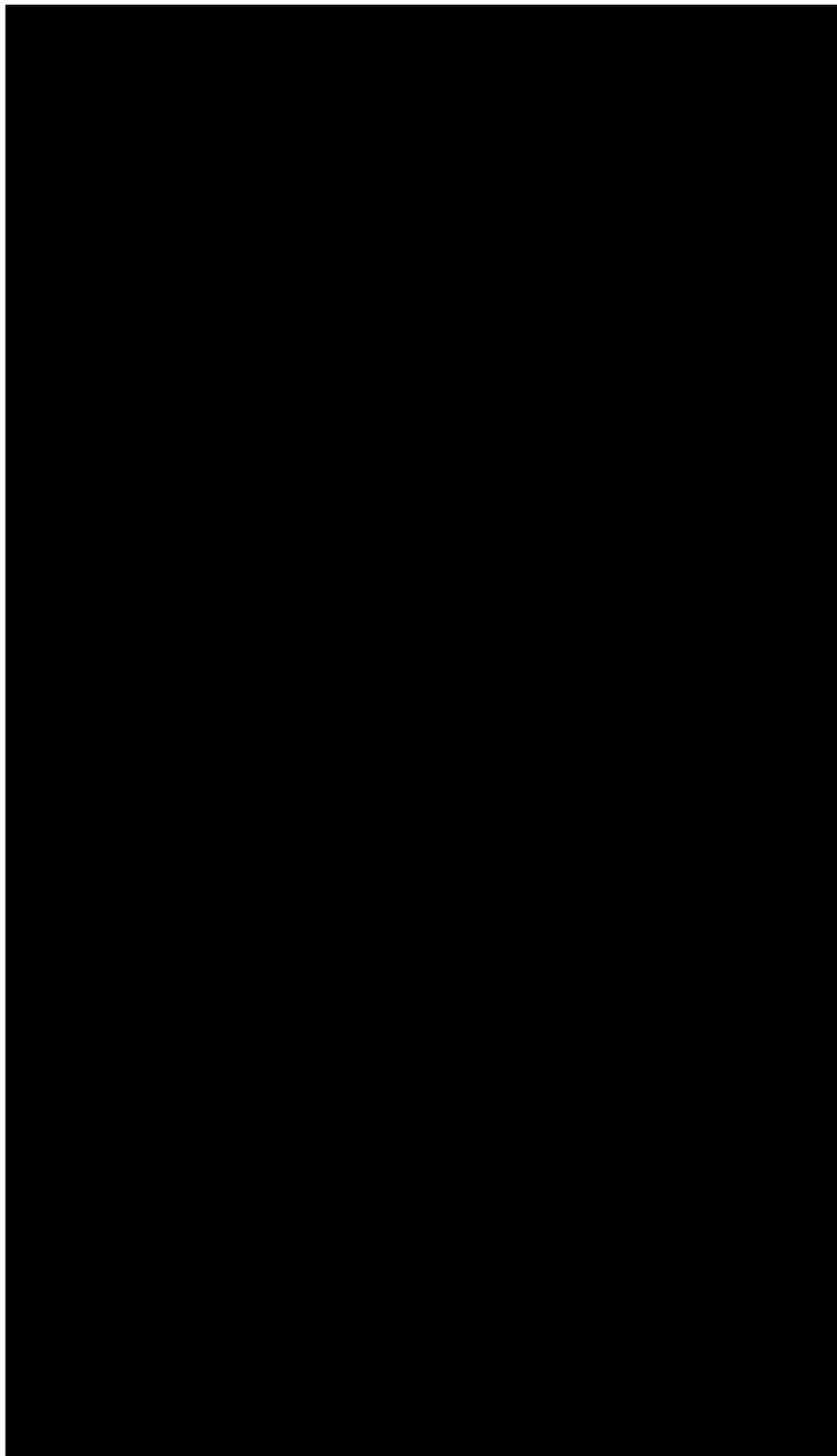
1. In the last 12 months has your job included the transport of goods?
  - Yes
  - No
2. Do you drive a vehicle as the main part of your job?
  - Yes
  - No
3. What type of vehicle do you usually drive for your job?
  - Car
  - Van
  - Rigid truck
  - Flatbed truck
  - Articulated truck
  - B double
  - Road train
  - Other (please specify) \_\_\_\_\_
  - Prefer not to say

## We need to know more about your job

4. Do you own the vehicle you drive for work?
- Yes
  - No
  - Prefer not to say
5. Do you work for more than one company?
- Yes
  - No
  - Prefer not to say
6. Which of the following best describes a typical work shift for you?
- Multiple trips beginning and ending at a “home base” (i.e. warehouse, depot)
  - A single long trip between two destinations
  - Multiple trips between two destinations
  - Prefer not to say
7. How far do you usually drive in one shift?
- 0–100 km of home base (i.e. warehouse, depot)
  - Between 100–500km of home base (i.e. warehouse, depot)
  - More than 500km from a home base (i.e. warehouse, depot)
  - Prefer not to say
8. On average, how many shifts do you work per week? (write one number only)
- \_\_\_\_\_
9. On average, how many hours is a typical shift? (write one number only)
- \_\_\_\_\_
10. How long have you been driving vehicles for a living?
- Less than 12 months
  - 1–5 years
  - 6–10 years
  - 11–20 years
  - 21–30 years
  - More than 30 years
  - Prefer not to say
11. During the last month, how were you usually paid?
- Flat hourly rate
  - Flat daily rate
  - Single time pay plus overtime
  - Flat weekly rate
  - Trip rate/per fare
  - Rate based on km travelled
  - Per delivery
  - Other (please specify) \_\_\_\_\_
  - Prefer not to say

**Transport workers experience distinct health risks. The next few questions are about your physical and mental health—your answers will help us improve the working health of Australian drivers.**

**12.** Under each heading, please tick the **ONE** box that best describes your health **today**.



We would like to know how good or bad your health is TODAY.

This scale is numbered from 0 to 100.

100 means the best health you can imagine.  
 0 means the worst health you can imagine.

Mark an X on the scale to indicate how your health is TODAY.

Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY =

The worst health you can imagine

**13.** Over the past **12 months** have you had treatment for, or been told by a doctor or a nurse that you have any of the following health conditions? (please select all that apply)

- Asthma
- Cardiovascular disease (e.g. heart attack, chest pain, heart failure)
- Diabetes
- Chronic Obstructive Pulmonary Disease (COPD)
- Arthritis
- Cancer
- Osteoporosis or osteopenia
- Stroke or cerebrovascular disease
- None of these
- Prefer not to say

**14.** Over the past **12 months** have you had treatment for, or been told by a doctor or a nurse that you have any of the following health conditions?  
(please select all that apply)

- High blood pressure or hypertension
- Mental health problems (e.g. anxiety, depression, panic attacks, post-traumatic stress disorder etc)
- Sleep apnoea
- Migraines or severe headaches
- Traumatic injury or accident
- Hayfever or allergic rhinitis
- Back problems
- High cholesterol
- None of these
- Prefer not to say

**15.** Have you experienced any physical pain in the last **week**?

- Yes – continue to question 16
- No – continue to question 18

**16.** Using a scale of 0 to 10, with **0** being **no pain at all** and **10** the **worst possible pain**, which best describes the pain you have felt during the **past week** (please circle your answer).



**17.** How long have you had your current pain problem?

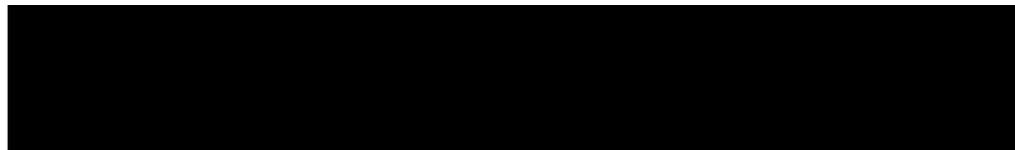
- Less than one week
- 1–2 weeks
- 3–4 weeks
- 4–5 weeks
- 6–8 weeks
- 3–6 months
- 6–9 months
- 9–12 months
- Over 1 year
- Prefer not to say

The following questions ask about how you have been feeling during the past 4 weeks. For each question, please choose the option that best describes how often you had this feeling.

18. In the last 4 weeks, how often did you feel—

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
...nervous?	<input type="checkbox"/>				
...hopeless?	<input type="checkbox"/>				
...restless or fidgety?	<input type="checkbox"/>				
...so sad nothing could cheer you up?	<input type="checkbox"/>				
...everything was an effort?	<input type="checkbox"/>				
...worthless?	<input type="checkbox"/>				

19. Using the scale of 0 to 10, with **0** being **completely unable to work** and **10** being **able to work at your best**, which best describes your ability to work today (please circle your answer)?



20. In general would you say your health is:

- Excellent
- Very Good
- Good
- Fair
- Poor
- Prefer not to say

Please tell us your height and weight. If you are not sure, please give your best guess.

21. What is your current height (in cm)?

\_\_\_\_\_

22. What is your current weight (in kg)?

\_\_\_\_\_

**Next, we would like to know about your driving**

In the last **12 months**, what is the total number of crashes you have been involved in while driving for work purposes?

- 0
- 1
- 2
- 3
- 4
- 5 or more
- Prefer not to say

**23.** Over the past **month**, what is the total number of near misses you have been involved in while driving for work purposes?

- 0—5 (once a week)
- 6—10
- 10—20
- 20—30 (daily)
- 30—50 (more than once a day)
- Prefer not to say

**To make full sense of how your work affects your health, we need to know a little bit about you.**

**24.** How old are you?

- < 18
- 18—24
- 25—34
- 35—44
- 45—54
- 55—64
- > 65
- Prefer not to say

**25.** Are you—

- Male
- Female
- Prefer not to say

**26.** Please tell us how you heard about the Driving Health study

- I was sent a text
- Saw it on Facebook
- Email from my employer
- Heard about it on the radio
- Heard from a friend/colleague
- Found it on the web
- Other (please specify) \_\_\_\_\_

## Thank you for completing this survey!

Would you like to further contribute to improving the workplace health of the Australian Driving Community?

We need to know more about the factors that influence your health and would like to ask you some questions on the phone, which we expect will take around 25 minutes to complete.

The first 700 people who complete the second survey will receive a \$20 Coles voucher.

Would you like to participate in the next part of the study?

- Yes
- No

If you would like to participate in the next part of our study please provide your contact details below.

This information will only be used by us to contact you for this research purpose and will not be made available to anyone else.

First name \_\_\_\_\_

Surname \_\_\_\_\_

Best contact number \_\_\_\_\_

Preferred contact times (when you will not be busy driving)

- Weekdays before 5PM
- Weekdays after 5PM
- Weekends
- Any other/specific time? \_\_\_\_\_

# Appendix II

**TABLE A1 DETERMINANTS OF SEVERE PSYCHOLOGICAL DISTRESS**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI	p	
Gender	Male	-0.4	0.197						
	Female	1							
Age	< 35 years	1.11	< 0.001	1.41	< 0.001	4.28	3.13	5.87	< 0.001
	35–44 years	0.4	0.01	0.62	< 0.01	1.91	1.37	2.67	< 0.001
	45–54 years	0.32	0.03	0.56	< 0.01	1.72	1.27	2.34	< 0.001
	> 55 years	1							
Driver experience	< 5 years	0.76	< 0.001	0.03	0.88				
	5–20 years	0.45	< 0.001	0.01	0.97				
	> 20 years	1							
Work type	Short-haul	0.29	0.01	0.31	0.04	1.54	1.18	1.99	< 0.01
	Long-haul	1							
Employment type	Owner driver	-0.27	0.08	-0.13	0.46				
	Employee driver	1							
No companies	Yes	-0.12	0.42						
	No	1							
Shift type	Multiple trips between same base	-0.05	0.7	-0.07	0.64				
	Single long trip between 2 locations	-0.4	0.01	-0.26	0.15				
	Multiple trips between 2 locations	1							
Vehicle type	Other	0.73	0.01	0.74	0.01	2.06	1.19	3.58	0.01
	Road train	-0.3	0.11	-0.15	0.51	0.81	0.53	1.26	0.35
	B Double	-0.21	0.15	-0.17	0.34	0.84	0.6	1.17	0.3
	Articulated truck	-0.19	0.2	-0.11	0.52	0.93	0.68	1.27	0.64
	Rigid truck	1							
Payment type	Flat rate	-0.1	0.67						
	Per trip/delivery	-0.12	0.66						
	Single time pay	-0.14	0.53						
	Km rate	-0.33	0.16						
	Other	1							

**TABLE A1 DETERMINANTS OF SEVERE PSYCHOLOGICAL DISTRESS**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	-0.75	< 0.001	-0.76	< 0.001	0.46	0.3	0.69	< 0.001
	<b>41–60 hrs</b>	-0.26	0.02	-0.25	0.06	0.76	0.59	0.98	0.03
	<b>&gt; 60 hrs</b>	1							
<b>BMI</b>	<b>Under or normal weight</b>	0.05	0.74	0.14	0.37				
	<b>Overweight</b>	-0.29	0.02	-0.01	0.93				
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	0.7	< 0.001	0.86	< 0.001	2.28	1.65	3.14	< 0.001
	<b>2 conditions</b>	1.04	< 0.001	1.33	< 0.001	3.65	2.57	5.18	< 0.001
	<b>3 or more conditions</b>	1.72	< 0.001	2.09	< 0.001	8.28	5.99	11.44	< 0.001
	<b>No conditions</b>	1							

**TABLE A2 DETERMINANTS OF POOR TO FAIR GENERAL HEALTH**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95%CI		p
Gender	Male	0.03	0.92						
	Female	1							
Age	< 35 years	-0.07	0.61						
	35–44 years	0.02	0.91						
	45–54 years	-0.07	0.59						
	> 55 years	1							
Driver experience	< 5 years	-0.03	0.85						
	5–20 years	0.08	0.47						
	> 20 years								
Work type	Short-haul	-0.06	0.57						
	Long-haul	1							
Employment type	Owner driver	-0.36	0.01	-0.15	0.34				
	Employee driver	1							
No companies	Yes	0.04	0.78						
	No	1							
Shift type	Multiple trips between same base	-0.28	0.04	-0.09	0.53				
	Single long trip between 2 locations	-0.36	0.02	-0.29	0.08				
	Multiple trips between 2 locations	1							
Vehicle type	Other	0.07	0.79						
	Road train	-0.01	0.96						
	B Double	-0.08	0.58						
	Articulated truck	-0.23	0.10						
	Rigid truck	1							
Payment type	Flat rate	-0.03	0.89						
	Per trip/delivery	-0.30	0.24						
	Single time pay	0.08	0.72						
	Km rate	0.04	0.85						
	Other	1							
Working hours	≤ 40hrs	-0.39	0.02	-0.46	0.01	0.65	0.45	0.92	0.02
	41–60 hrs	-0.06	0.57	-0.02	0.85	1.00	0.80	1.25	0.98
	> 60 hrs	1				1.00			

**TABLE A2 DETERMINANTS OF POOR TO FAIR GENERAL HEALTH**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95%CI		p
<b>BMI</b>	<b>Under or normal weight</b>	-1.23	< 0.001	-0.99	< 0.001	0.37	0.28	0.49	< 0.001
	<b>Overweight</b>	-0.71	< 0.001	-0.49	< 0.001	0.61	0.47	0.78	< 0.001
	<b>Obese</b>	1				1.00			
<b>Diagnosed conditions</b>	<b>One condition</b>	0.87	< 0.001	0.84	< 0.001	2.26	1.69	3.04	< 0.001
	<b>2 conditions</b>	1.46	< 0.001	1.34	< 0.001	3.89	2.81	5.38	< 0.001
	<b>3 or more conditions</b>	2.25	< 0.001	2.05	< 0.001	8.04	5.92	10.91	< 0.001
	<b>No conditions</b>	1							

**TABLE A3 DETERMINANTS OF SEVERE PAIN**

		Univariate		Initial Multivariate		Final Multivariate		
		B	p	B	p	OR	95% CI	p
<b>Gender</b>								
	Male	-0.25	0.44					
	Female	1						
<b>Age</b>								
	< 35 years	-0.10	0.43					
	35–44 years	-0.32	0.03					
	45–54 years	-0.05	0.70					
	> 55 years	1						
<b>Driver experience</b>								
	< 5 years	-0.10	0.46					
	5–20 years	-0.11	0.31					
	> 20 years	1						
<b>Work type</b>								
	Short-haul	-0.17	0.09	-0.10	0.37			
	Long-haul	1						
<b>Employment type</b>								
	Owner driver	-0.16	0.26					
	Employee driver	1						
<b>No companies</b>								
	Yes	-0.02	0.91					
	No	1						
<b>Shift type</b>								
	Multiple trips between same base	-0.12	0.38					
	Single long trip between 2 locations	-0.13	0.39					
	Multiple trips between 2 locations	1						
<b>Vehicle type</b>								
	Other	0.21	0.42					
	Road train	-0.30	0.10					
	B Double	-0.11	0.42					
	Articulated truck	-0.20	0.14					
	Rigid truck	1						
<b>Payment type</b>								
	Flat rate	-0.18	0.40					
	Per trip/delivery	0.08	0.75					
	Single time pay	-0.18	0.40					
	Km rate	-0.12	0.58					
	Other	1						

**TABLE A3 DETERMINANTS OF SEVERE PAIN**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	-0.25	0.14	-0.22	0.22				
	<b>41–60 hrs</b>	-0.17	0.11	-0.13	0.26				
	<b>&gt; 60 hrs</b>	1							
<b>BMI</b>	<b>Under or normal weight</b>	-0.37	0.01	-0.07	0.64				
	<b>Overweight</b>	-0.13	0.25	0.12	0.35				
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	0.95	< 0.001	1.00	< 0.001	2.59	1.95	3.44	< 0.001
	<b>2 conditions</b>	1.39	< 0.001	1.40	< 0.001	4.02	2.94	5.50	< 0.001
	<b>3 or more conditions</b>	2.08	< 0.001	2.09	< 0.001	7.98	5.99	10.62	< 0.001
	<b>No conditions</b>	1							

**TABLE A4 DETERMINANTS OF PAIN LASTING MORE THAN YEAR**

		Univariate		Initial Multivariate		Final Multivariate		
		B	p	B	p	OR	95% CI	p
Gender	Male	0.16	0.621					
	Female	1						
Age	< 35 years	-0.24	0.078	0.03	0.85			
	35–44 years	-0.35	0.015	-0.13	0.40			
	45–54 years	-0.10	0.453	-0.02	0.91			
	> 55 years	1						
Driver experience	< 5 years	-0.22	0.106					
	5–20 years	-0.07	0.503					
	> 20 years	1						
Work type	Short-haul	-0.25	0.012	-0.21	0.07			
	Long-haul	1						
Employment type	Owner driver	0.02	0.902					
	Employee driver	1						
No companies	Yes	0.09	0.538					
	No	1						
Shift type	Multiple trips between same base	-0.16	0.228					
	Single long trip between 2 locations	-0.07	0.637					
	Multiple trips between 2 locations	1						
Vehicle type	Other	0.17	0.507					
	Road train	-0.12	0.521					
	B Double	-0.04	0.742					
	Articulated truck	-0.22	0.108					
	Rigid truck	1						
Payment type	Flat rate	-0.35	0.103					
	Per trip/delivery	-0.12	0.631					
	Single time pay	-0.40	0.069					
	Km rate	-0.24	0.283					
	Other	1						

**TABLE A4 DETERMINANTS OF PAIN LASTING MORE THAN YEAR**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	-0.18	0.272	-0.14	0.46				
	<b>41–60 hrs</b>	-0.20	0.063	-0.12	0.34				
	<b>&gt; 60 hrs</b>								
<b>BMI</b>	<b>Under or normal weight</b>	-0.30	0.025	0.08	0.59				
	<b>Overweight</b>	-0.18	0.131	0.09	0.48				
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	0.93	< 0.001	0.98	< 0.001	2.53	1.90	3.36	< 0.001
	<b>2 conditions</b>	1.48	< 0.001	1.50	< 0.001	4.40	3.20	6.04	< 0.001
	<b>3 or more conditions</b>	2.04	< 0.001	2.05	< 0.001	7.69	5.77	10.26	< 0.001
	<b>No conditions</b>	1							

**TABLE A5 DETERMINANTS OF HIGHER QUALITY OF LIFE UTILITY SCORE.**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
Gender	Male	0.02	0.53						
	Female	1							
Age	< 35 years	0.02	0.09	-0.02	0.10				
	35—44 years	0.03	0.01	0.00	0.84				
	45—54 years	0.01	0.36	-0.01	0.39				
	> 55 years	1							
Driver experience	< 5 years	0.02	0.06	0.02	0.12				
	5—20 years	0.02	0.11	0.02	0.14				
	> 20 years	1							
Work type	Short-haul	0.01	0.46						
	Long-haul	1							
Employment type	Owner driver	0.03	0.05	0.01	0.29				
	Employee driver	1							
No companies	Yes	0.01	0.66						
	No	1							
Shift type	Multiple trips between same base	0.03	0.01	0.02	0.13				
	Single long trip between 2 locations	0.04	0.01	0.02	0.04				
	Multiple trips between 2 locations	1							
Vehicle type	Other	-0.03	0.16	-0.04	0.08	0.96	0.93	1.01	0.09
	Road train	0.02	0.22	0.02	0.17	1.02	0.99	1.05	0.14
	B Double	0.00	0.78	0.02	0.21	1.01	0.99	1.03	0.38
	Articulated truck	0.02	0.11	0.02	0.07	1.02	0.99	1.04	0.16
	Rigid truck	1							
Payment type	Flat rate	0.02	0.37						
	Per trip/delivery	0.01	0.75						
	Single time pay	0.02	0.30						
	Km rate	0.01	0.54						
	Other	1							

**TABLE A5 DETERMINANTS OF HIGHER QUALITY OF LIFE UTILITY SCORE.**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	0.04	0.01	0.04	0.01	1.05	1.02	1.08	< 0.01
	<b>41–60 hrs</b>	0.02	0.04	0.02	0.08	1.02	1.00	1.04	0.01
	<b>&gt; 60 hrs</b>	1							
<b>BMI</b>	<b>Under or normal weight</b>	0.05	<0.001	0.02	0.05				
	<b>Overweight</b>	0.02	0.02	0.00	0.86				
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	-0.07	< 0.001	-0.06	< 0.001	0.94	0.92	0.96	< 0.001
	<b>2 conditions</b>	-0.11	< 0.001	-0.10	< 0.001	0.90	0.87	0.92	< 0.001
	<b>3 or more conditions</b>	-0.19	< 0.001	-0.18	< 0.001	0.82	0.81	0.84	< 0.001
	<b>No conditions</b>	0.02	0.53						

**TABLE A6 DETERMINANTS OF DRIVING PERFORMANCE (NEAR MISSES)**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
Gender	Male	0.13	0.76						
	Female	1							
Age	< 35 years	1.07	< 0.001	1.29	< 0.001	3.28	2.30	4.67	< 0.001
	35—44 years	0.63	< 0.01	0.87	< 0.001	2.07	1.42	3.04	< 0.001
	45—54 years	0.15	0.41	0.29	0.14	1.27	0.88	1.84	0.21
	> 55 years	1							
Driver experience	< 5 years	0.70	< 0.001	-0.10	0.68				
	5—20 years	0.37	0.01	-0.14	0.44				
	> 20 years	1							
Work type	Short-haul	-0.12	0.34						
	Long-haul	1							
Employment type	Owner driver	-0.21	0.26						
	Employee driver	1							
No companies	Yes	0.08	0.64						
	No								
Shift type	Multiple trips between same base	-0.10	0.54						
	Single long trip between 2 locations	-0.17	0.35						
	Multiple trips between 2 locations	1							
Vehicle type	Other	0.18	0.57						
	Road train	-0.16	0.50						
	B Double	0.28	0.09						
	Articulated truck	0.07	0.70						
	Rigid truck	1							
Payment type	Flat rate	0.13	0.64						
	Per trip/delivery	0.24	0.46						
	Single time pay	0.29	0.30						
	Km rate	0.26	0.38						
	Other	1							

**TABLE A6 DETERMINANTS OF DRIVING PERFORMANCE (NEAR MISSES)**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	-0.97	< 0.001	-0.75	< 0.01	0.45	0.27	0.73	< 0.01
	<b>41–60 hrs</b>	-0.50	< 0.001	-0.40	< 0.01	0.66	0.51	0.86	< 0.01
	<b>&gt; 60 hrs</b>	1							
<b>BMI</b>	<b>Under or normal weight</b>	0.25	0.12	0.31	0.07				
	<b>Overweight</b>	-0.20	0.19	0.01	0.94				
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	0.42	0.02	0.57	< 0.01	1.69	1.17	2.44	< 0.01
	<b>2 conditions</b>	0.32	0.11	0.52	0.01	1.60	1.06	2.40	0.03
	<b>3 or more conditions</b>	0.80	0.00	1.11	< 0.001	2.94	2.06	4.20	< 0.001
	<b>No conditions</b>	1							

**TABLE A7 DETERMINANTS OF DRIVING PERFORMANCE (CRASHES)**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
Gender	Male	0.94	0.02	0.83	0.05				
	Female	1							
Age	< 35 years	0.53	0.01	0.40	0.21				
	35–44 years	0.17	0.49	0.09	0.76				
	45–54 years	-0.20	0.41	-0.10	0.71				
	> 55 years	1							
Driver experience	< 5 years	0.74	< 0.001	0.50	0.12				
	5–20 years	0.33	0.08	0.12	0.62				
	> 20 years	1							
Work type	Short-haul	0.34	0.04	-0.01	0.97				
	Long-haul	1							
Employment type	Owner driver	-0.35	0.17	-0.02	0.95				
	Employee driver	1							
No companies	Yes	-0.05	0.83						
	No	1							
Shift type	Multiple trips between same base	0.12	0.59						
	Single long trip between 2 locations	0.24	0.35						
	Multiple trips between 2 locations	1							
Vehicle type	Other	-0.49	0.26	0.42	0.36				
	Road train	1.05	< 0.01	0.77	0.05				
	B Double	0.41	0.05	0.30	0.24				
	Articulated truck	0.49	0.02	0.53	0.02				
	Rigid truck	1							
Payment type	Flat rate	-0.49	0.17	-0.79	0.04	0.57	0.28	1.13	0.11
	Per trip/delivery	0.05	0.90	-0.11	0.80	0.98	0.45	2.16	0.97
	Single time pay	0.34	0.32	0.18	0.62	1.30	0.67	2.53	0.44
	Km rate	-0.37	0.31	-0.45	0.29	0.64	0.31	1.33	0.23
	Other	1							

**TABLE A7 DETERMINANTS OF DRIVING PERFORMANCE (CRASHES)**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	-0.59	0.07	-0.51	0.15				
	<b>41–60 hrs</b>	0.11	0.53	0.13	0.53				
	<b>&gt; 60 hrs</b>	1							
<b>BMI</b>	<b>Under or normal weight</b>	0.42	0.03	0.49	0.03				
	<b>Overweight</b>	-0.13	0.53	0.00	0.99				
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	0.32	0.19	0.40	0.11	1.36	0.85	2.20	0.20
	<b>2 conditions</b>	0.34	0.20	0.45	0.11	1.36	0.81	2.28	0.25
	<b>3 or more conditions</b>	0.61	0.01	0.70	0.00	1.77	1.13	2.78	0.01
	<b>No conditions</b>								

**TABLE A8 DETERMINANTS OF WORK ABILITY**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
Gender	Male	0.10	0.75						
	Female	1							
Age	< 35 years	0.04	0.74	0.31	0.03	1.37	1.04	1.80	0.03
	35—44 years	-0.28	0.06	-0.02	0.91	0.98	0.72	1.33	0.90
	45—54 years	-0.24	0.08	-0.08	0.55	0.91	0.69	1.19	0.49
	> 55 years	1							
Driver experience	< 5 years	0.14	0.30						
	5—20 years	-0.04	0.73						
	> 20 years	1							
Work type	Short-haul	0.07	0.51						
	Long-haul	1							
Employment type	Owner driver	0.01	0.92						
	Employee driver	1							
No companies	Yes	0.16	0.27						
	No	1							
Shift type	Multiple trips between same base	-0.11	0.41	0.04	0.77				
	Single long trip between 2 locations	-0.41	0.01	-0.22	0.17				
	Multiple trips between 2 locations	1							
Vehicle type	Other	0.28	0.28	0.37	0.18	1.45	0.85	2.49	0.17
	Road train	-0.27	0.13	-0.04	0.85	0.86	0.59	1.25	0.43
	B Double	-0.43	< 0.01	-0.44	< 0.01	0.59	0.45	0.79	< 0.001
	Articulated truck	-0.34	0.01	-0.27	0.06	0.75	0.57	0.99	0.04
	Rigid truck	1							
Payment type	Flat rate	0.13	0.54						
	Per trip/delivery	0.44	0.09						
	Single time pay	0.26	0.23						
	Km rate	0.16	0.47						
	Other	1							

**TABLE A8 DETERMINANTS OF WORK ABILITY**

		Univariate		Initial Multivariate		Final Multivariate			
		B	p	B	p	OR	95% CI		p
<b>Working hours</b>	<b>≤ 40hrs</b>	-0.25	0.14						
	<b>41–60 hrs</b>	-0.03	0.80						
	<b>&gt; 60 hrs</b>	1							
<b>BMI</b>	<b>Under or normal weight</b>	-0.58	< 0.001	-0.41	< 0.01	0.66	0.50	0.87	< 0.01
	<b>Overweight</b>	-0.52	< 0.001	-0.35	< 0.01	0.71	0.56	0.91	0.01
	<b>Obese</b>	1							
<b>Diagnosed conditions</b>	<b>One condition</b>	0.68	< 0.001	0.71	< 0.001	1.99	1.50	2.64	< 0.001
	<b>2 conditions</b>	1.15	< 0.001	1.14	< 0.001	3.14	2.28	4.32	< 0.001
	<b>3 or more conditions</b>	1.87	< 0.001	1.85	< 0.001	6.40	4.77	8.59	< 0.001
	<b>No conditions</b>	1							