



Economic pressure, multi-tiered subcontracting and occupational health and safety in Australian long-haul trucking

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Abstract

Purpose – The purpose of this research is to analyse the relationship between economic pressure, multi-tiered subcontracting and occupational health and safety (OHS) outcomes for employee and owner/drivers in long-haul trucking, using Australian evidence.

Design/methodology/approach – The analysis is based on direct interviews with 300 long-haul drivers, using a structured questionnaire along with an examination of documentary records, statistics and government reports. Qualitative and quantitative data were gathered on self-reported acute and chronic injuries, the incidence of occupational violence, truck crashes, indicators of illicit drug use, hours of work/fatigue and psychological distress.

Findings – Variations between owner/drivers and employees working for small and large firms were investigated. Overall, owner/drivers reported worse OHS than small fleet and, more especially, large fleet drivers. Evidence also indicated a connection between economic pressure, the expansion of contingent work and negative OHS outcomes.

Research limitations/implications – Further longitudinal and comparative research is needed to test the hypothesized link between competitive pressures, supply chain rationalization and OHS outcomes. Research to investigate these issues in other countries is required in order to compare findings with those for Australia and to assess the effectiveness of new enforcement initiatives.

Practical implications – Findings suggest the need for policy interventions aimed at improving OHS to address commercial practices, including elaborate subcontracting chains, more explicitly than is currently the case with road transport regulation. Recent moves in this direction are identified.

Originality/value – Unlike manufacturing, healthcare and the public sector, there have been few studies of the OHS effects associated with contingent work arrangements in transport. In addition to helping to fill this gap the paper provides evidence on the effects of competitive pressure and supply chains on work practices and OHS.

Keywords Road transport, Contingent workers, Occupational health and safety, Employment, Injuries, Australia

Paper type Research paper



Introduction

The long haul road freight industry has a well-earned reputation for being highly competitive. Over the past 20 years a combination of supply chain rationalisation, new work systems and government policies have intensified competition, lowering operator returns and encouraging an array of cost-saving employment practices. The latter

include increased subcontracting of driving tasks and use of contingent work and pay systems (such as delivery time bonus/penalties and linking pay to miles/kilometers traveled).

In the European Union, North America and Australia links have been drawn between the combination of deregulation and intense competition with long-hours/fatigue, use of illicit drugs and road crashes. Yet, while a growing body of international research has found an association between contingent work arrangements, (such as those involving the use of self-employed subcontractors, and inferior occupational health and safety (OHS) outcomes, few studies have focused attention on the transport industry (Quinlan *et al.*, 2001a).

Against this background, the aim of this article is to explore the impact of competitive and supply chain pressures and contingent work arrangements on OHS outcomes in road transport, drawing on an Australian survey of 300 employee and owner/drivers. The remainder of the paper is divided into four parts. The first provides an overview of the industry and the changes to it that have been seen to affect OHS. The second part describes the methodology employed by the study. Part three, then, goes on to present the study's results, while the last part provides a general conclusion.

Supply chains, competition and “sweating” in road transport

In Australia, North America and Western Europe road freight is the dominant mode of internal transport and has been steadily increasing its share of total freight relative to other modes, most notably rail (Hoj and Kroger, 2002). The for-hire component of road transport is an extremely competitive industry, characterised by numerous operators (including many small and single-truck firms (Houtman *et al.*, 2004), relatively easy entry (and correspondingly high levels of business turnover), intense price-based bidding for freight tasks with limited scope for niche markets (based on technology or product differentiation), and shippers/clients exerting considerable market pressure.

Over the past two decades several developments have intensified competitive pressures on road freight operators. Companies, including manufacturers, have increasingly outsourced transport. Further, the economic concentration of road freight users, like supermarket chains, has enhanced their bargaining power, especially against the background of the negotiation of long term agreements with suppliers (like manufacturers and agricultural produce growers), improved business logistics in terms of warehousing and increased reliance on just-in-time (JIT) deliveries. Information technology (computers, email, faxes, mobile phones and global positioning) has also facilitated leaner warehousing and the integration of complex subcontracting networks, enabling large transport operators to become “logistics” firms that largely outsource delivery to a raft of smaller operators, using an increasingly contingent workforce. In 2000, for example, while 187,006 non-transport firms in Australia retained their own truck fleets, the 31,810 for-hire operators (including 72 fleets with over 50 trucks and 21,726 single truck operators) accounted for a far more than proportionate share of freight movement (over half the total distance traveled by trucks that year) and were growing their share of the total freight task as more companies outsourced transport. As such, road transport both mirrors supply chain rationalisation in other industries (Kopczak and Johnson, 2003; Lund and Wright, 2003; Wright and Lund, 2003) and is a vital link in many supply chains, taking raw materials to manufacturers and the finished products to wholesalers, retailers and

customers. In this context, the supply chain perspective recognises inter-organisational networks and power relationships may have profound implications for employers and workers in a particular industry (see Lund and Wright, 2003).

Institutional and regulatory changes resulting from the growing influence of neo-liberal ideas on government policy-making at national and supranational level have also increased competition in transport. At national level, competitive pressure has been affected by improvements to road infrastructure, changes to truck size/configuration rules and driver/operator licensing (removing state/provincial requirements), the deregulation of rail transport (including corporatisation/privatisation) and competition policies preventing rate fixing amongst operators. Beyond the national level, free trade agreements, like NAFTA, and the European Union's (EU) enlargement and liberalisation of road haulage have removed barriers to truck movements, opening up previously protected markets to lower cost operators (Plehwé, 2003).

Road transport operators have responded to these pressures largely through work intensification and reducing labour costs. Measures include opting for larger trucks, using fleets more intensively, reducing driver payments by renegotiating rates or opting for trip/incentive-based pay, shifting to self-employed drivers, engaging cheaper drivers (including Eastern European drivers in the EU) or getting drivers to work longer hours for the same pay. As a report prepared by the EU Director General for Research, Division for Agriculture, Regional Policy, Transport and Development (2001, p. 3) observed:

... falling company profits will result in radical changes in wage structure and downward pressures on pay levels and social benefits ... Market observers describe the haulage industry as being riddled with illegal practices ... The restructuring of the transport sector which has been under way for several years now is likely to become an even more painful process when the Community is enlarged to include more countries with low wage levels ... Another problem is the threat to road safety that these poorly paid drivers could pose through fatigue or lack of food. There has been an increase in the number of detected cases of failure to comply with prescribed rest period ...

In the USA Belzer (2000) documented the impact of deregulation on operator viability (including widespread bankruptcies) and driver earnings (average wages of trucking employees fell 26.8 per cent between 1978 and 1990), especially for non-unionised drivers. Similarly, Engel (1998, p. 40) found intense competition following deregulation benefited road freight clients but had dubious effects on the industry, including declining union representation, lower and more output-based pay, increased workloads, high labour turnover and driver shortages. Belzer argued that trucking met the classic definition of a "sweated" industry where intense competition amongst employers reduces pay to a point where the longest working hours provide a bare subsistence imperiling health and wellbeing.

With minor variations, the same elements of sweating (intense competition/low returns and instability amongst operators, poor pay and long hours amongst drivers) have been identified in the EU (Hamelin, 2000; Environment, Transport and Regional Affairs Committee, 2000; Houtman *et al.*, 2004) and Australasia (Croke, 1998; Williamson *et al.*, 2000; Storey, 1996). Indeed, labour and taxation laws in the EU and Australia have provided a stronger incentive for the use of owner-operators to reduce labour costs than is the case in the USA (Houtman *et al.*, 2004; Belzer, 2000 and

Quinlan, 2001). For example, in the EU owner/drivers have been exempted from the 2002 working time directive until at least 2009 (Directive 2002/15/EC cited in Houtman *et al.*, 2004, p. 37).

A government inquiry into trucking safety in Australia in 2000 found that faced with pressure to reduce freight rates and meet tighter schedules large trucking operators had cut costs by reducing their employee workforce and subcontracting task to smaller firms (who might further sublet tasks) or self-employed operators. Asked why subcontractors were cheaper, the operations manager of a larger road transport firm bluntly stated (cited in Quinlan, 2001, p. 126):

... because they don't value their labour, all their labour component ... he might pay himself a wage but that wage won't be anywhere near what an employee driver would get ... Generally, the interstate subcontractors won't value the part of their wage that's tacked on at the beginning or start of the trip.

In short, subcontractors failed to adequately cover their capital, maintenance or labour costs as a result of such practices as failing to cost waiting time to load/unload, backloading (taking a return load at a highly discounted rate), not charging for local deliveries and working extended hours. While easy finance (to purchase a truck), limited employment prospects in country towns and poor business practices were partly to blame, submissions from a wide range of parties indicated that small operator behaviour was largely shaped by their dependent position in the subcontracting chain and limited bargaining power in relation to both large trucking operators and customers (evidenced by loading delays, the refusal to pay demurrage and delays in payment). Intense competition between employee drivers and owner/drivers had further induced a shift to trip-based payment systems as operators sought to spread the financial risk to their drivers and adopt pay systems more conducive to evading legal minimum wages enunciated in state and federal transport awards. Two large surveys (Williamson *et al.*, 2000; Feyer *et al.*, 2001) confirmed these findings, with 68 per cent of drivers reporting they worked under a payment by results system and 17 per cent stating they received less than the legal minimum (award) rates.

Put into a historical context, there is nothing especially novel about the association between intense competition, multi-tiered subcontracting and sweating (Quinlan *et al.*, 2001b). Writers on the labour process like Littler (1982) have highlighted the historical importance of the system of "putting out" work and the failure to acknowledge the re-emergence of such systems as an integral part of the "new economy" is an unfortunate consequence of the labour process perspective losing popularity amongst social scientists to arguably inferior paradigms like postmodernism. This is not to say that the supply chains based on multi-tiered subcontracting found today are identical to those (in the clothing trade and elsewhere) of a century ago. Contemporary networks are often more elaborate, extend internationally and rely on information technology. In trucking, the latter interlinks shippers, freight forwarders, loading agents, small and large carriers, warehouses and consignees in tendering for work, assigning loads, scheduling and actual delivery. However, technology should not detract attention from the underlying aspects of work organisation that shape the work experience of drivers.

Despite making significant use of contingent workers, road transport is one of several industries (another is hospitality) largely omitted from the now substantial body of research on the effects of job insecurity, outsourcing, employment status and OHS (Blank *et al.*, 1995; Rebitzer, 1995; Benach *et al.*, 2000; Quinlan *et al.*, 2001b). This

gap may seem surprising given the industry's poor OHS record. In Australia, the European Union and North America road transport accounts for the largest number of work-related fatal injuries and multiple fatality incidents (most occur on highways) of any industry and large truck-involved crashes are also costly (Drudi and Zak, 2004; Zaloshnja and Miller, 2004). In terms of fatality incidence the occupation of truck driver ranks between the fourth and eighth most dangerous (Toscano and Windau, 1998; Suarez, 1999; NIOSH, 2000, p. 41). A similar ranking applies to non-fatal injuries and occupational diseases although workers' compensation claim records (and other data sources like accident reporting) understate injuries because self-employed drivers lack coverage and there are disincentives (time, cost, fear of losing work) for firms and employee drivers to report minor incidents/injuries (Quinlan and Mayhew, 1999; Newman, 2003). Injury and fatality statistics also fail to take account of more insidious and under-researched health effects, including the impact of long hours and job pressures on work/non-work balance, work-related stress, and occupational violence/road rage, or indications of premature death and above-average suicide rates amongst drivers (Lycan and Ryder, 2003; de Croon *et al.*, 2002; Cescon and Nelson, 1999; Siebert, 2003).

An apparent reason for the absence of research into the OHS effects of contingent work arrangements is that the vast bulk of research into safety in the trucking industry has focused on transport safety (in terms of policy and publications) rather than OHS. Historically, trucking has been primarily regulated under road transport (and associated environmental and dangerous goods) legislation in most countries, with OHS legislation and inspectorates playing a negligible role. The transport safety perspective is at least as concerned with the wellbeing of other road users as truck drivers; a focus that is, in part, understandable given that in the past decade other drivers, pedestrians etc. have constituted around two thirds of those killed in heavy vehicle crashes in Australia (Quinlan, 2001) and the fact that the public safety focus has been given added impetus in Europe by several catastrophic road tunnel incidents.

Against this background, areas of substantial research investigation have included the nature and incidence of fatal and non-fatal truck crashes (Hamelin, 1987; Hakkanen and Summala, 2001; Australian Transport Safety Bureau, 2004); long hours/fatigue and drug use by truck drivers (Philip *et al.*, 2002; Mitler *et al.*, 1997; Hartley, 1999); driver behaviour/compliance with transport laws (Beilock, 1995), and the effects of truck size/configuration and road/bridge design on safety (Apparies *et al.*, 1998; Forkenbrock and Hanley, 2003). They have also included heavy vehicle vibration and musculoskeletal injuries (Jensen *et al.*, 1996; Tesche *et al.*, 1999; Mabbott *et al.*, 2001), driver exposure to diesel fumes etc. (Boffetta and Silverman, 2001; Steenland *et al.*, 1998) and stroke/cardiovascular disease (Hedberg *et al.*, 1998).

Overall, therefore, research into trucking safety has largely been preoccupied with symptoms (non-compliance with the law, crashes, fatigue and drug use) and paid little attention to investigating factors like competition and commercial practices that a series of government reports (for example, May *et al.*, 1984; EU Director General for Research, Division for Agriculture, Regional Policy, Transport and Development, 2001) have found to encourage hazardous work practices. There are exceptions. In Australia, driver surveys undertaken by Hensher and colleagues (Hensher and Battellino, 1990; Hensher *et al.*, 1991; Golob and Hensher, 1994) in the late 1980s, early 1990s, found self-reported safe behaviour (speeding, hours of work and drug use) was affected by delays in loading

and unloading, the insecurity of owner/drivers and the insecurity of trip-based pay. Similarly, research by Williamson *et al.* (2000) and Feyer *et al.* (2001) found a clear connection between trip-based pay and fatigue/breaches of driving hour laws and drug use, while also identifying shipper influence on driver schedules, dispatcher failures to take account of non-driving tasks in scheduling, and the failure of operators to manage subcontractors. In Europe, Stoop and Thissen (1997) argued that highly articulated transport systems with narrow windows for service/delivery (like JIT) were not conducive to safety and a study undertaken for the European Foundation for the Improvement of Living and Working Conditions (Houtman *et al.*, 2004, p. 33) found that performance-based pay compromised safety. Meanwhile, a US study by Braver *et al.* (1999) found that while shippers contributed to the tight schedules on drivers, other factors like delays also exerted an influence. Driver and carrier-based studies undertaken by Belzer *et al.* (2003) have further identified a close link between overall payment levels and safety and, like Hensher *et al.*, found that the more wasted unpaid time drivers have, the more likely they were to squeeze too many working hours into a day.

In sum, while most research into trucking OHS ignores economic pressures and supply chain dependencies, a growing body of studies have found pay levels and systems and competition for work/scheduling pressures to be associated with dangerous work practices (speeding, excessive hours and drug use) and work-related injuries. The present study sought to further explore these inter-relationships, comparing three different categories of drivers and using a wider array of OHS indices.

Methodology

During May/June 2000, a survey of 300 truck drivers was undertaken across the Australian state of New South Wales (the most populous state and a conduit for east coast trucking). The research process was designed to ensure, as far as possible, that interviewees were a representative sample of long-haul truck drivers. Interviewed drivers had to drive on a range of highways (with numbers selected on the basis of traffic levels on particular routes), in different types of trucks (B/double, semi, and rigid vehicles) and carry a variety of goods (general goods, fuel, cattle, furniture etc). To capture differences in employment status and dependency, similar proportions of interviewees were sought from owner/drivers, employee drivers in small fleets and employee drivers in large fleets. The distinction between large and small fleet drivers was critical because, like owner/drivers, small fleets (defined as 20 or fewer trucks) predominantly work as subcontractors to large carriers. While random selection procedures were impossible to implement, it is believed that the distribution of interviewees was representative of long haul traffic on different highways.

Drivers were interviewed face-to-face at two or more sites on each of six major highways (five were interstate) using a questionnaire with closed and open-ended questions. Overall, 33 per cent of the sample were owner/drivers, 34.7 per cent were employed in small fleets and 28.3 per cent worked in large fleets. A total of 4 per cent reported another employment status like an owner/driver who returned his truck to the finance company the day before interview (given its size and diversity no attempt was made to compare responses from this group). Truck drivers were approached at freight-forwarding yards, highway truckstops and truck parking areas. Of 331 drivers approached, 31 refused and 300 (or 90.6 per cent) agreed to participate. All but one interviewee were male.

Interviewees were asked questions about OHS, influences on their working lives and other issues affecting risk. Qualitative and quantitative data were collected and analysed according to employment status. Any marked variations by the highway on which drivers were working on the day of interview were also identified. Anonymity was guaranteed (names of drivers or companies were not recorded) and drivers were encouraged to speak freely about their experiences. Quotations from drivers are provided in italics (and interview number in brackets) to assist readers to understand driver attitudes and experiences.

Acute and chronic injuries, occupational violence, truck crashes, illicit substance use, hours of work and fatigue and levels of stress

Drivers were asked about their OHS over the past 12-months, including acute injuries and illnesses, chronic conditions, occupational violence, truck crashes, hours of work and fatigue, as well as completing the General Health Questionnaire (GHQ-12). A number also volunteered comments on illicit drug use.

Acute work-related injuries

Injuries and illnesses experienced in the past 12-month period were separated into those that did not require driving to cease (this category also sought to take account of reporting bias due to the “normalisation” of injury) and those that did (see Table I).

Types of injuries suffered by drivers were similar across the different employment groups, with upper and lower limb lacerations and manual handling injuries common. Incidence patterns were also similar across all groups when “acute injury” and “injuries that did not stop work” categories were combined. In total, around 25 per cent of the truck drivers interviewed had experienced a work-related injury or illness in the past 12-months. This was high when compared to an incidence of 3.6 per cent per year for employees in the combined Transport and Storage industry sector taken from the National Data Set (NDS) based on workers’ compensation claims across Australia (NOHSC, 1999, p. 23). That recorded workers’ compensation claims were significantly lower than self-reported injuries of the 300 drivers is indicative of a significant reporting gap.

There was similarity in the severity of injuries that required a cessation of driving and those that did not. Owner/drivers were less likely to seek medical treatment for their injury than employee drivers even when the injury was quite serious. Asked whether injuries had been treated, 36.7 per cent of owner/drivers said “no”, 23.3 per cent said “yes by me/family/friend”, and 40 per cent said “yes by doctor/nurse/hospital” (40 per cent). By way of contrast, when small fleet drivers were asked whether their injuries had been treated: 8 per cent responded “no”, 28 per cent responded “yes by me/family/friend”, and 64 per cent responded “yes by doctor/nurse/hospital”. The difference was even more pronounced for large fleet drivers even though they reported similar proportions of acute

Table I.
Acute work-related injury and illness experiences in past 12-month reported by 300 interviewed drivers

	Owner/drivers (n = 99) (%)	Small fleet drivers (n = 104) (%)	Large fleet drivers (n = 85) (%)	Other (n = 12) (%)
Acute injury	6.1	15.4	15.3	
Minor injury that did not stop work	22.2	10.6	12.9	

and non-acute injuries (and of similar types) to small fleet drivers. When asked whether their injuries were treated, only 4.5 per cent of large fleet drivers said “no”, 9.1 per cent said “yes by me/family/friend”, and 86.4 per cent said “yes by doctor/nurse/hospital”.

Small and large fleet employee drivers more commonly took time-off for recuperation than owner/drivers. While only 6.1 per cent of owner/drivers reported an acute injury, qualitative data indicated they were under significant economic stress and had to continue working - sometimes with major injuries. Of the 19 owner/drivers who responded when asked whether their injury required time off work, 36.8 per cent said “no”, 42.1 per cent said “no but slowed me down”, and 21.05 per cent said “yes had time off”. The “no but slowed me down” written comments included:

... was supposed to, but I laughed at him – financial pressures (5).

The average amount of time off work was four weeks; these work absences followed surgery, a severe fall, health problems following excessive drug taking, and a complex leg/foot fracture after being hit by a car on the roadside, e.g.:

... six weeks off for operation. Supposed to be three months but could only afford six weeks – and couldn’t really afford that (61).

Small fleet drivers took longer periods off work than owner/drivers but they were also under financial pressure that sometimes had severe consequences. Of 27 small fleet drivers responding when asked whether their injury required time off work, 18.5 per cent replied “no”, 33.3 per cent replied “no but slowed me down”, and 48.1 per cent said “yes”. Amongst the latter a number of drivers reported cutting short their leave due to work or income insecurity. One driver stated:

I was given six weeks off work but the following Sunday (three days later) was told “here’s another job to do and if you don’t do it, you haven’t got a job” (213).

The average amount of time off was 4.9 weeks; with this time off most frequently following fractures.

In contrast, the responses of large fleet drivers ($n = 18$) with regard to time off for injury were “no” (5.5 per cent), “no but slowed me down” (44.4 per cent), and “yes” (50 per cent). The average amount of time off was two and a half weeks (most frequently following surgery or a fracture), so they had less time-off than did small fleet and owner/drivers. The reasons for diminished recuperation time were not readily apparent. A possible explanation is that more secure employees were willing to report less serious conditions to their employer and implement interventions earlier. Consistent with this interpretation, it is worth noting that chronic conditions are more likely to develop from untreated injuries.

In sum, while the overall incidence of reported injury was similar amongst the three groups, owner/drivers had more “little things” and small and large fleet employee drivers were more likely to check the “yes injured” box, seek medical treatment and to take time off work to recuperate. Three possible explanations for these variations are:

- (1) “normalisation” of injury was more common amongst owner/drivers;
- (2) intense economic pressures on owner/drivers induced them to work while injured; and
- (3) large fleet drivers felt sufficiently secure to report a greater proportion of their injuries.

These explanations are not mutually exclusive and all three may have shaped responses. Nonetheless, qualitative responses provide some support for the conclusion that financial pressures on owner/drivers (e.g. for truck re-payments) encouraged more to self-treat injuries or continue to work while injured than those in more secure employment situations. Furthermore, consistent with a hierarchy of dependency interpretation, responses indicated that small fleet drivers were also under financial pressure, though not to the same extent as owner/drivers.

Chronic work-related injuries

To identify whether patterns of chronic disability mirrored those of acute injury each interviewee was asked “do you have any chronic injuries that have built up slowly over time?” (see Table II).

Unexpectedly, chronic injuries were reported at around double the rate of acute ones. Overall, 55.5 per cent of owner/drivers, 48.1 per cent of small fleet and 54.1 per cent of large fleet drivers cited at least one chronic injury and many had more than one injury. Back injuries, hearing loss, knee and shoulder movement limitations were common. However, the types of chronic injury varied across the employment sub-groups. Chronic back injuries were more common amongst owner/drivers (35.3 per cent) and small fleet drivers (33.6 per cent) than for those employed in large fleets (23.5 per cent). This may reflect improved access to mechanical loading/unloading equipment in larger operations or a lack of early preventive and treatment interventions amongst owner/drivers and small fleet drivers. Conversely, chronic hearing loss was more commonly reported amongst large fleet drivers (29.4 per cent) than those in small fleets (19.2 per cent) and owner/drivers (16.2 per cent). A possible explanation is that more large fleet drivers had been scientifically tested for hearing loss so the condition had been recognised (hearing loss is notoriously difficult to self-estimate). Alarming, seven of the 300 drivers interviewed commented on poor eyesight as a chronic injury. Overall, the level of chronic injury amongst truck drivers is of concern.

Occupational violence experiences in past 12-month period

While occupational violence has been increasingly recognised as a significant OHS issue there has, to our knowledge, been no prior research into this phenomenon in long haul trucking. In our study each interviewee was asked “have you been verbally abused, threatened or assaulted at work in the last 12 months” (see Table III).

Table II.
Chronic work-related
injury experiences of 300
interviewed drivers

	Owner/drivers (n = 99) (%)	Small fleet drivers (n = 104) (%)	Large fleet drivers (n = 85) (%)	Other (n = 12) (%)
No	45.4	51	43.5	75
Yes, back injury	35.3	33.6	23.5	16.7
Yes, hearing loss	16.2	19.2	29.4	16.7
Yes, other	15.1	9.6	16.5	8.3
Total	55	50	46	3
% with any chronic injuries	55.5	48.1	54.1	25

A total of 141 drivers provided written comments on 143 violent incidents. Owner/drivers and drivers in small fleets experienced more occupational violence (especially verbal abuse) than large fleet drivers – possibly as a consequence of their longer hours of driving and, hence, exposure to other motorists. Three distinctive types of violence were identified:

- (1) verbal abuse and violence from other motorists (67.1 per cent of all incidents);
- (2) abuse and threats from staff at freight forwarding or loading yards (16.1 per cent); and
- (3) abuse by customers when deliveries were delayed or more expensive than expected (9.8 per cent).

A further 5.6 per cent were interpreted by the drivers as RTA/police harassment while 1.4 per cent of incidents could not be allocated to a category.

Severity appeared to vary across these three types of violence, with road violence potentially the most severe while that from customers was least likely to result in a physical assault (see Mayhew and Quinlan, 2001). The qualitative and quantitative data indicated different causes for each form of occupational violence.

Road rage incidents occurred most frequently in heavy traffic situations near roundabouts or red lights, or on highways when heavily laden vehicles drove slowly up hills. Three drivers had missiles thrown at them (86, 158, 208), and two of the 300 interviewed drivers had been shot at in the past 12-months (20, 100). A contributing factor appears to be a lack of understanding by motorists of truck stopping limitations and space requirements for turning. Abuse and threats at freight-forwarding yards, on the other hand, were closely linked to economic and time pressures. Loading delays exacerbate tensions and fuel aggression because waiting time is unproductive (and commonly unpaid for owner/drivers):

I'm a union delegate. From management, mainly over day-to-day running and things they know they should do and it comes to an argument to get them done (198).

Customers, especially small customers forced to adopt JIT under threat from larger firms, were also subject to economic and time pressures since delays in freight arrival could threaten their very survival. Hence it was not surprising that altercations occasionally occurred:

	Owner/drivers (<i>n</i> = 99) (%)	Small fleet drivers (<i>n</i> = 104) (%)	Large fleet drivers (<i>n</i> = 85) (%)	Other (<i>n</i> = 12) (%)
No	45.4	54.8	57.6	66.7
Verbally abused	36.4	35.6	25.9	25
Threatened	10.1	6.7	5.9	8.3
Assaulted	1		1.2	
Road rage	21.2	19.2	21.2	33.3
Total number	54	47	36	4
% with violent experiences	54.5	45.2	42.3	33.3

Table III.
Occupational violence
experiences of 300
interviewed truck drivers

... from customers. Usually little customers who are struggling for survival and have to take it out on someone (192).

Overall, data indicated occupational violence is a poorly recognised, but significant, OHS problem for long haul truck drivers. While road violence has to be understood in a wider context (Mayhew and Quinlan, 2001), aggression at loading yards and from customers is rooted in the intense economic and time pressures endemic in this industry.

Truck crashes

A significant proportion of work-related injuries in road transport result from truck crashes (Newman, 2003). Drivers were asked whether they had had any truck crashes in the past 12 months and, if so, to describe the situation and time of day or night when the incident occurred. As can be seen from Table IV, 12.5 per cent of small fleet drivers reported major crashes that required work to cease in the previous 12 months, compared to 10.1 per cent of owner/drivers and 5.9 per cent of large fleet employees. Large fleet drivers (7.1 per cent) cited more “little crashes” that did not stop them driving (7.1 per cent) than those in small fleets (4.8 per cent) or owner/drivers (3 per cent). The lower “serious” crash incidence amongst large fleet drivers may have resulted from greater use of shuttle systems so drivers slept at home more frequently, increased implementation of fatigue management guidelines, greater compliance with log-book requirements, and comparatively lower levels of chronic severe fatigue. Large fleet drivers were, on average, much younger than owner/drivers (10.6 per cent over age 55 v. 21.2 per cent) but this difference did not extend to small fleet drivers who had a crash record similar to owner/drivers.

The survey did not enable an estimation of crash severity and any attempt to do this is liable to be subject to “healthy worker” effect as severely injured drivers are likely to have exited the industry. However, a number of major insurers indicated to the NSW trucking inquiry that they set higher premiums for owner/drivers due to their costlier claims experience (Quinlan, 2001, p. 63). While consistent with our survey results (if employee drivers are merged into single category as insurers do), we were unable to test this proposition. What can be noted is that crashes are liable to have a more detrimental effect on owner/drivers by disrupting their capacity to earn a living if they are severely injured, the truck is badly damaged or the subsequent insurance claim is disputed. As one owner/driver observed:

... cow on road after dark and hit it ... \$38,000 damage to truck and \$12,000 loss of income. Six months ago and insurance company from farmer flatly refuses to pay. We have now got to take them to court ... and they are dragging it out (61).

Table IV.
Truck crashes in past 12 months reported by 300 interviewed drivers

	Owner/drivers (n = 99) (%)	Small fleet drivers (n = 104) (%)	Large fleet drivers (n = 85) (%)	Other (n = 12) (%)
Major road crash	10.1	12.5	5.9	8.3
Minor road crash that did not stop work	3	4.8	7.1	

Regarding injury, 6.1 per cent of owner/drivers reported they had no workers' compensation or accident insurance, 9.1 were unsure, and even those with cover indicated a reluctance to make claims due to income loss or for fear it would damage future work prospects. The truck crash experiences of drivers over the previous five years were assessed to identify if a similar pattern had existed for a number of years. In contrast to the pattern of crashes in the past 12 months, in the five-year time-span more owner/drivers (20.2 per cent) reported crashes than small fleet drivers (18.3 per cent) or large fleet drivers (15.3 per cent); although little crashes that did not stop driving remained more common amongst large fleet drivers (8.2 per cent) followed by small fleet drivers (7.7 per cent) and owner/drivers (3 per cent).

Illicit drug use, hours of work and fatigue

The use of illicit drugs may enhance the capacity of truck drivers to stay alert, work longer hours and drive longer distances although there can be significant negative impacts including experiencing hallucinations whilst driving (Hensher *et al.*, 1991, p. 63). While interviewees were not asked questions about illicit drugs, 23 drivers volunteered statements about personal use, or use by other drivers, with Amphetamines (or speed) the most commonly cited substance. Many of these drivers condoned illicit drug use on the grounds it reduced the risk of fatigue-related smashes. Notably, penalties for drug use focused on individual drivers (e.g. license revocation) not the companies that employed them and thus ignored economic and other pressures on drivers to use drugs.

Hours worked per week are an important determinant of levels of fatigue. In Australia the legal limit for truck drivers is 72 hours per week, far in excess of limits pertaining to other workers, but comparable to driving limits in Canada and somewhat longer than legal limits in the USA and EU. Responses indicated that 40 per cent of drivers worked over the legal limit. Owner/drivers more frequently worked 73 or more hours per week (47.5 per cent), closely followed by those in small fleets (43.3 per cent) with a substantial gap to large fleet drivers (27 per cent). Employment status differences were therefore found to correlate with variations in driving hours. Moreover, these variations in driving hours were found to be compounded by the fact that, for owner/drivers, "time off" was often spent on other essential tasks like truck maintenance. Chronic fatigue was the inevitable consequence (see Table V).

Consistent with other Australian research (Williamson *et al.*, 2000; Feyer *et al.*, 2001) qualitative and quantitative responses suggested long driving hours resulted from poor returns/incentive payment systems, intense competition for freight contracts and cost pressures on operators (especially small firms and owner/drivers). Faced with poor returns, the most ready source of income was working longer hours, particularly from cash-in-hand jobs.

The General Health Questionnaire (GHQ-12)

Levels of psychological distress were assessed through use of the General Health Questionnaire (GHQ-12). The GHQ-12 measures current perceived state of health and predicts general future physical health. Despite limitations (particularly amongst interviewees uncomfortable in "pencil and paper" situations), the GHQ-12 has proved a robust and widely used tool in health studies (Goldberg, 1972, pp. 82-99). The GHQ-12 pre-set questions have numerical scores allocated for each response that are totalled to

Table V.
Distribution of hours
worked per week by 300
interviewed truck drivers

Hours	Owner/drivers (n = 99) (%)	Small fleet drivers (n = 104) (%)	Large fleet drivers (n = 85) (%)	Other (n = 12) (%)	Total drivers by hours worked (%)
Under 24	6.1				2
25-34	1				0.3
35-39				8.3	0.3
40	1	4.8	1.2	8.3	2.7
41-49	3	2.9	2.3		2.7
50-59	15.1	17.3	15.3	8.3	15.7
60-69	12.1	20.2	28.2	33.3	20.3
70-72	12.1	11.5	24.7		15
73+	47.5	43.3	27	41.7	40
No answer	2		1.2		1

give an overall score. Past studies indicate a score around 8.59 is relatively normal and a score greater than 14 is so clinically significant that the person probably requires urgent treatment. The GHQ-12 was attempted by 290 of the 300 interviewed drivers. Responses were scored via the Likert method, with the lowest score recorded at 0 and the highest at 33. Drivers from all sub-groups consistently scored above the 8.59 baseline, with 15.7 per cent (or 47 respondents) above the clinically significant figure of 14. High scores came disproportionately from owner/drivers (21 scored more than 14 – 44.6 per cent of all drivers achieving this score), who were approximately twice as likely to record a high score as small or large fleet drivers.

Variations in GHQ-12 scores on the basis of employment status, highway and other factors were examined in-depth. The lowest GHQ-12 scores were found amongst drivers paid the award rate or a km/trip rate with a bonus, while the highest scores were recorded amongst owner/drivers with insecure and highly variable incomes. An examination of routes and qualitative responses reinforced the economic pressure connection. The Hume Highway – the busiest and most competitive route in Australia connecting Sydney to Melbourne – accounted for 40.4 per cent of over 14 scores (but only 26.3 per cent of driver interviews). Finally, when drivers were asked to nominate three major problems they encountered, four of the eight most nominated responses related to financial and economic pressures, namely fuel, registration, insurance etc. costs (nominated by 26.3 per cent of respondents); freight rates/financial (21.3 per cent), low pay (18.7 per cent), and big companies, loading agents and competition (15.7 per cent). When these responses were compared to GHQ-12 scores the patterns were compelling. Over 85 per cent of owner/drivers on the Hume highway nominated fuel, registration, insurance costs as a major problem (compared to 62 per cent of owner drivers as whole and 26.3 per cent of all drivers) and 68.6 per cent of the same group nominated freight rates/financial pressures (compared to 35.5 per cent of all owner drivers and 21.3 per cent of all drivers). In other words, the subgroup of drivers with the highest GHQ-12 scores was the same group who most frequently volunteered statements about intense financial pressures in the industry.

Conclusion

Overall the study suggests long haul truck drivers carry a heavy burden of injury, ill health and stress. Most interviewees reported a chronic injury, many had experienced

truck crashes or work-related injuries/illnesses, and working hours were long. Endemic fatigue was almost the norm and illicit substances were sometimes sought to sustain working effort. The incidence of truck crashes and high GHQ-12 scores amongst drivers was correlated with longer working hours and greater economic stress. Intense competition resulted in acceptance of non-viable freight rates, excessive and illegal working hours, and stressed and chronically fatigued truck drivers. Similar inter-relationships between long hours, drugs, low pay, excessive competition and poor OHS have been identified in the European Union and North America although our study is the first, to our knowledge, to use the GHQ-12 to measure psychological distress.

Beyond this there were some important differences according to employment status and economic pressure. Owner/drivers did not report more acute or chronic injuries than small or large fleet employee drivers but qualitative data indicated potential reporting biases due to economic pressure (and limited access to workers' compensation) and owner/drivers were far less likely to seek medical treatment for their injuries or take time off work. Owner/drivers were also more likely to have experienced occupational violence, to have worked beyond their legal limits and to have suffered a serious crash (except with regard to small fleet drivers in the 12 month time span). The mean GHQ score for owner/drivers was also higher than for the other two categories. Taken as a whole, the qualitative and quantitative data indicated that competitive pressures had a direct negative flow-on to OHS, and exacerbated levels of risk. The GHQ-12 results therefore indicated the extreme stress many owner/drivers operated under. The OHS outcomes, further, appeared to be poorest amongst owner/drivers working on the most competitive of routes; that is, those under the greatest economic stress. As expected given their place in the trucking supply chain, OHS outcomes for small fleet drivers generally fell between large fleet drivers and owner/drivers, though closer to the latter.

The study suffered from a number of limitations that should be addressed in future research. First, while the evidence in this paper is suggestive there is a need to develop more explicit measures of supply chain effects on OHS. At the same time, it is worth noting that governments are already beginning to accept the need to regulate supply chains to protect worker health and wellbeing. In New South Wales, for example, a mandatory code governing clothing outworkers has been introduced along with a fatigue management regulation in trucking which includes supply chain provisions (Nossar *et al.*, 2004; NSW Occupational Health and Safety Amendment [Long Distance Truck Driver Fatigue] Regulation 2005). Meanwhile, unions are pushing for further regulation as well as supply chain provisions in collective agreements and industrial tribunal determinations (see Notice of Dispute Under Sections 130 and 332 of the Transport Workers' Union of NSW, IRC No. 6942 of 2004 – Safety Crisis in the Transport Industry).

Second, many studies of the OHS effects of contingent work rely on comparing different (often two) groups of workers like employees and subcontractors or permanent and temporary employees. Our study sought to capture different levels of contingency by comparing owner/drivers with small and large carrier employees. At one level, the results justified this selection Owner/drivers had the worst OHS outcomes and large fleet drivers the best, with small fleet drivers in between. However, the comparative approach presumes that the growth of contingent work arrangements

doesn't have flow-on effects to non-contingent workers. In long haul trucking intense competition has not only increased subcontracting by large operators but also increased pressure on employee drivers and a growing reliance on trip-based payment so working conditions and OHS are deteriorating for all three groups. Hence, simple comparisons may understate the effect of contingent work arrangements (a similar effect may apply in occupations like teaching or hospitality because a growing reliance on temporary workers has led to an increased administrative/supervisory load on permanent staff). However, while longitudinal research methods provide a potential means of addressing this issue, the short tenure of subcontractors or temporary workers present major problems in terms of using them and, in particular, virtually rule out the use of cohort studies.

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