

# Peer Reviewed Papers

## Lay Perceptions of Responsibility and Accountability for Fatigue-Related Road Crashes

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### Abstract

Small groups of participants acting as mock juries heard an audiotape of the summing up arguments in a fatigue-related truck-crash court case. When asked to decide if they thought that the defendant was guilty, participants found the defendant not guilty significantly more often than guilty. Furthermore, their decision of guilt was not affected by whether the defendant was an individual or a corporation. Issues that participants thought important when coming to their decision were the awareness of sleepiness by the defendant and communication that the driver had with others earlier in the day prior to the crash. On average, when asked to allocate penalties, participants gave an average of half the maximum penalty to the defendant. Coupled with the low conviction rate, and the content of the discussions captured when the groups were coming to their decisions, this study suggests that the seriousness of driver fatigue is under-recognised by the general public.

### Introduction

Fatigue is a serious problem in the road transport industry, with a 2007 estimate that in the Australian State of New South Wales, 20% of fatal crashes were fatigue-related [1]. Considerable progress is being made in understanding the biological underpinnings of fatigue, and this information is slowly being incorporated into legal and regulatory structures in many jurisdictions. In addition to legislative requirements to manage fatigue, regulators are also using education and training campaigns directed at the general public (see for example the "Think!" campaign in the United Kingdom). Nevertheless, the knowledge base of the general public and how this information is used to make day-to-day decisions about driving and working in relation to fatigue are unknown.

This paper considers how people perceive the issue of fatigue and make decisions in relation to it in the context of commercial driving operations. For the purposes of this article, fatigue is defined as a subjective desire to rest and an aversion to continue with the task at hand coupled with an objective decrease in

performance as time without sleep increases, moderated by circadian factors [2]. The term was used in this study in preference to drowsiness or tiredness because the majority of road safety campaigns to date have used the term fatigue.

Following a fatigue-related motor vehicle crash, authorities have a number of potential legal remedies. If the crash is particularly severe, involving death, authorities can lay formal criminal charges against either the driver, and/or the (usually corporate) employer of the driver [3]. One of the elements of this process involves the court making an assessment about what a defendant knew or should have known about what they did. The use of a mock jury provides a framework for the investigation of how members of the general public in Australia understand and assesses what ought be known about fatigue when driving.

As with other workplace safety topics, the question of fatigue involves the interaction of overlapping duties by different parties, in particular between the (usually corporate) employer and the employee. The question of corporate criminality has been the subject of considerable debate in the legal literature [4], in particular whether corporations should be subject to the criminal law in the same way as natural persons. Nevertheless, at the present time in Australia, corporations can be charged with criminal offences under certain circumstances and this paper will utilize a mock jury process to investigate attitudes towards corporate criminal responsibility for fatigue.

Psychological research has been used to explain and predict the ways in which a random selection of citizens come together to make a decision in the jury setting. Currently, there is no directly relevant research into the question of jury decision making in fatigue-related scenarios (see [5] for a review of jury research). In the context of corporate legal responsibility, research has been conducted into whether the populace has a general anti-corporate defendant bias [e.g. 6- 9], although to date such research is inconclusive. Nevertheless, the research does suggest that people evaluate the acceptability of corporate action in the context of social responsibility, rather than a

traditional economic analysis which proposes that corporate responsibility primarily is based on a duty to maximize return to shareholders [10]. The research indicates that people expect that corporations will behave ethically [11] and a failure of ethical behaviour can have a range of adverse consequences. In particular, corporations will be disapproved of when they are involved in a crisis that was preventable [12].

The present study three main aims. First, as corporations have an ethical and legal responsibility to manage fatigue in their operations, and as a large section of the road transport industry is controlled by corporations, we sought to test the prediction that participants from the general public would expect corporations to effectively manage fatigue such that fatigue-related crashes are avoided or minimised. Therefore, we expected that if a fatigue-related crash does occur, it is more likely that a defendant corporation will be held responsible, and held to a higher degree of responsibility, than when one of their employees is a defendant, because the employee has relatively less control over fatigue management practices of the organisation.

A further aim of this study was to explore the decision making process that participants from the general public use when coming to conclusions about fatigue-related crashes. Finally, this study explored the extent to which driving while fatigued is considered a serious safety risk by members of the general public.

## Participants

Sixty seven participants (29 males, 38 females, mean age 25 years, range 18 – 70 years) took part in the study. They were recruited by placing advertisements on a local university student employment website, and by recruiting from a retired persons social club, to capture a range of age groups. The only criteria for inclusion was that the individual was over 18 years old and an Australian citizen and thus eligible for jury service in South Australia. No participants had participated in a jury before, and none had worked as a long distance truck driver.

## Method

Participants were divided into groups of 3-7 individuals (14 groups in total), and presented with a short audio tape of the summing up arguments of the prosecution and the defence in a fatigue-related truck crash case, in which fatalities and serious injury occurred. The groups were randomly assigned to one of two defendant identity conditions: (1) where a truck driver was the defendant, and (2) where the driver's corporate employer was the defendant. Each presentation lasted approximately 20 minutes in total.

After listening to the arguments, but before discussing the scenario and without others in the group, participants were asked to complete a questionnaire stating their opinion as to the guilt of the defendant (guilty/not guilty), as well as to assign a percentage of responsibility that they believed each party bore in relation to the crash. They were instructed that the

percentage responsibility that they assigned each party did not need to have any relationship to the decision of guilt. Thus, theoretically a party could be not-guilty, but still be assigned 100% responsibility. They were then asked to nominate the maximum penalty that should be applied in a fatigue-related fatality situation, and what penalty that they would apply to the defendant in the scenario they with which they were presented.

Participants were also asked to complete a questionnaire on their perceptions of the strength and reasonableness of various arguments that the prosecution and defence raised on a 7 point Likert-type scale. After doing this, participants were asked to discuss and come to a conclusion in their groups as to the guilt of the defendant. They were instructed to reach a unanimous verdict if possible. This discussion was videotaped for transcription and later analysis.

The study was approved by the Human Research Ethics Committee of the University of South Australia, and participants were remunerated AU\$50 for inconvenience and their time.

## Materials

The general scenario presented to the participants was that a driver of a truck was involved in a crash in which two people died when his truck failed to negotiate a bend. On the night before the crash, the driver had obtained about five hours of sleep, and he had worked for 32 hours in the prior three days. When the driver came into the depot where he was to collect the truck on the morning of the crash, he commented to his employer that he felt exhausted. For the defendant identity condition manipulation, the text was altered so that the name of the defendant was either that of the driver or of the company. It could be inferred from the facts presented that the driver fell asleep. The defendant was charged with culpable driving causing death, although the section of the act (s. 318(2)(b) of the Crimes Act, 1958 (Vic)) was not specifically identified

## Analytic Methodology

Quantitative and qualitative data were collected in the study. The quantitative (questionnaire-derived) data, consisting of the assessment of guilt (guilty / not guilty) and percentage of responsibility, were analysed by Chi Squared test and independent samples t-test, respectively. The questionnaire data were also analysed using linear and binomial regression techniques, where the responsibility percentage and guilt responses were considered as dependant variables. The quantitative analyses were conducted using the Statistical Package for the Social Sciences (SPSS) Version 12 for Windows program (SPSS Inc., Chicago, Illinois, USA).

The analysis of the qualitative data transcribed from video tapes had two purposes - to identify any differences in arguments raised in the two defendant identity conditions, and to assess the discussions in an exploratory fashion to identify arguments that participants used in coming to their conclusions. The analysis was conducted using a modified approach to grounded theory method [13]. This involved scrutinizing the conversations to identify categories of arguments made by the participants, and describing how the categories interacted with one another. An independent rater also coded a sample of the transcripts based on the category matrix established. The inter-rater reliability ( $\kappa = .7$ ) was at the level traditionally considered to be sufficient [14].

## Results

Sixty six of the sixty seven participants recorded a guilty or not guilty decision. Of the 32 participants with a corporate defendant, 8 found it guilty. With an individual defendant, 14 of 34 participants found him guilty. Although there were significantly more participants that recorded a not-guilty decision ( $\chi^2 = 7.1$ ,  $p < 0.01$ , effect size  $\phi = .328$ ), there were no significant difference between defendant identity conditions on the finding of guilt (defendant type:  $\chi^2 = 2.5$ ,  $p > 0.05$ , effect size  $\phi = .195$ ).

The level of responsibility assigned to the different parties followed a similarly non-significant pattern of differences. The corporation was assigned a mean responsibility level of 43% (SD 19.7%) and the mean responsibility level assigned to the individual was 57% (SD 19.8%). This difference was not significant ( $t = .35$ ,  $p > 0.05$ , effect size  $d = .7$ ).

Participants responded that they would have assigned average maximum financial penalty of \$330,000 (Range \$0 - \$2M; SD \$400,000) and average imprisonment period of 96 months (range 0 months – 300 months; SD 92 months) for a crime of this type. In the scenario presented, the participants would have fined the defendant 55% (SD 31%) of the maximum financial penalty that they nominated and 46% (SD 30%) of the maximum imprisonment time.

As there were no effects of defendant identity condition, the groups were combined for the subsequent analyses. Binary logistic regression performed on responses to the questionnaire items indicated that three items were significantly associated with a guilty decision. When these three items were inspected, it became apparent that two of them were associated with the

topic of the self awareness of sleepiness that the driver possessed. The other significant item was related to the topic of the quality of the communication between the employer and the driver. Table 1 lists the items that were found to be significantly associated with the guilt decision, as well as the general topic with which they were associated.

Stepwise multiple regression analysis performed on the same items against the assigned percentage of responsibility indicated that six were significantly associated with the decision. When these items were inspected, it was apparent that four of the six could be assigned into the “self awareness of sleepiness” and “communication” topics. In addition, two items concerned with the topic of sleep emerged as also having a significant association with the attribution of responsibility (See Table 2).

Qualitative analyses from the transcripts of the discussions revealed no evidence of an anti-corporation bias, although there was discussion of concern over perceived poor industry-wide work practices.

Examples of statements made that illustrate this line of argument are:

- The driver in the scenario worked too many hours
- The driver was not getting enough time off or enough sleep, e.g. “And his previous work roster for the past three days, thirty hours in three days, he was working 60 hours a week ... So if that’s an indication, his previous rosters, then he’s working a 12 hour day or something, and to me he’s not getting enough sleep.”
- There is a dangerous culture of excessive working hours in the industry e.g. “Um, well experience I suppose. In industry, bosses do work their drivers very hard and long hours...”
- This culture can generate sleep debt and doesn’t consider drivers’ family and social lives, e.g. “So he had worked something similar in the past few days... I would expect that it would build up a certain sort of sleep debt with that lifestyle” and “That’s a very [pause], kind of neglecting the fact that people have social lives and you don’t just go home sleep and sleep after work. That’s not what happens and [the company] should be aware of that.”

In addition, some participants expressed the view that fatigue was a special threat to the road transport industry which put the employer on notice. They proposed that this should lead to the

**Table 1. Items found to be significantly associated with the guilt decision**

Question	Topic	Wald value	Sig
How important did you consider the awareness that the driver had of his tiredness or the possibility that he might fall asleep?	Self Awareness	4.3	<.05
How important did you consider that the conversation was that the driver had with his employer on the morning of the crash?	Self Awareness	9.1	<.01
How reasonable did you think the argument that the driver communicated his level of tiredness with his employer was?	Communi-cation	4.3	< .05

1 The experiment was conducted before the amendment to the *Crimes Act* that makes driving while fatigued a manner by which negligence can be established.

**Table 2. Items found to be significantly associated with the attribution of responsibility.**

Question	Topic	$\beta$	t	Sig.
How reasonable did you think the argument that the driver communicated his level of tiredness with his employer was?	Communi-cation	.348	3.9	< .01
How reasonable did you think that the argument was that the employer thought that the driver had an opportunity to get enough sleep on the night before the crash?	Sleep	-.337	-4.0	< .01
How reasonable did you think that the argument was the employer thought that the driver was only saying that he was tired because he had just got up?	Communi-cation	-.235	-2.68	.01
How important did you think how much sleep the driver managed to get on the night before the crash was ?	Sleep	-.262	-3.08	< .01
How important did you think the employer's conversation with the driver on the morning of the crash was?	Communi-cation	.269	2.90	< .01
How important did you consider the awareness that the driver had of his tiredness or the possibility that he might fall asleep?	Self Awareness	-.179	-2.12	< .05

employer having a responsibility to be vigilant to the possibility of fatigue. For example, one participant said:

*"... but in a trucking industry, I mean, the most common cause of an accident is fatigue. So if your employee comes in and says, 'Oh, I'm completely bumbling today mate', I think the company has a responsibility to take that seriously. I mean fatigue is a serious issue in the industry so why wouldn't you take it seriously? So yeah, I blame it on the company"*

Thus, any negative attitudes were expressed in terms of specific practices, not against the institution or the corporate body.

Exploratory analysis was undertaken to determine if further patterns of responses could be deduced from the discussions. There were 58 participants in 13 groups that provided the material for the analysis of the qualitative data generated by the group discussions. For a verdict to be reached from the material presented, participants had to draw inferences from the facts presented based on their understanding of the nature of fatigue and its impact in the workplace. The complexity of the subject area was reflected in the discussions, as 10 of the 13 groups (77%) raised the point that they thought that the responsibility did not lie exclusively with either the driver or the employer (i.e. they both ought to share some of the blame).

For most of the groups, a single argument per debate emerged as pivotal. The most frequent pivotal argument (nine of the 13 groups) was that the driver knew, or due to his experience should have known, that he was tired, and therefore had a responsibility to pull over. However, this was not universally supported, as there were some arguments in opposition to this point, mainly that the driver did not intend deliberately to crash (and wouldn't have continued to drive if he thought that he might). Some participants made the argument that shift work always makes people feel tired, and that would make the driver unable to make an assessment of how he would perform.

In total, 82 different arguments were identified in the discussions which could be classified into three themes. These were:

1. The responsibility that the driver had to assess his capacity to begin driving. eg "The driver is a professional driver, that is what he does, and he had enough time to get sleep. And he knew what he was doing the next day ..."
2. The introspective capacity of the driver to gauge his own fatigue during the trip (and the related sub-theme of his responsibility to pull over when a threshold of fatigue had been reached) e.g. "...I think that the [driver] has the responsibility to pull over and stop, and that he could assess how tired he was."
3. The working arrangements that the company had in place in general, including the responsibility that it held towards its drivers.

In addition, there was a distinction made about whether the driver should have started driving at the start of the day because he knew, or ought to have known that he was unfit to drive, and whether the driver should have stopped driving at some point later due to his inability to continue driving safely. The relevance of this distinction appeared to be that the driver was assessed as having responsibility at both of those points in time, but the employer was only assessed as having a responsibility towards the driver at the start of the day.

When the penalties that each participant were compared, there were no differences between the groups. To counter for the range of potential penalties, the comparisons were made between the percentage of the potential maximum that each participant allocated in this instance. The overall average financial penalty recommended was 54.5% of the maximum, and the average custodial sentence was 45% of the nominated maximum.

<sup>2</sup> In the scenario, the driver and a manager had a brief discussion, including an exchange in which the manager asked how the driver was, to which the driver replied that he was exhausted.



## Discussion

Although there was an overall tendency for participants to find the defendant not guilty on the facts given, one third of participants found them guilty. Indeed, during the discussions none of the groups assigned 100% responsibility to either party, suggesting that participants considered the responsibility for managing fatigue in the long haul road transport industry to be shared between drivers and management. This result occurred notwithstanding the fact the instruction to the participants that there was not necessarily any association between their guilty/not guilty decision and their assignation of percentage responsibility. Unfortunately, the literature does not contain any direct comparisons of acquittal rates and responsibility for other road traffic safety offences (e.g. drink driving or drug driving).

Analysis of the questionnaire material indicated that there were nine questions that were significantly related to either the guilt or percentage responsibility (see Tables 1 and 2). Upon inspection it became apparent that they could be assigned into three broad thematic categories: self-awareness of fatigue, communication with the employer and sleep history. These three categories can largely be aligned with the categories that emerged from the qualitative thematic analysis of the discussions. The self awareness category maps directly on to the self awareness theme, and the communication category is tied into the policy theme. The final category, sleep history, is related to the working arrangements that the company had in place, although there was not a lot of discussion directly about what length of sleep would be acceptable.

Both the questionnaire and qualitative analyses indicated that the most important issue to consider when making decisions about fatigue-related crashes is the ability for the parties involved to determine the extent to which the driver was able to self-assess his level of fatigue and therefore his competency to drive safely. Participants tended to assume introspection was a suitable and accurate technique for self-assessing fatigue. Thus, participants argued that the driver would be aware of how much sleep he needed, how tired he was and when he should engage in an appropriate countermeasure. One could argue that this is a reasonable proposition, as repeated exposure to a situation and its outcome is the basis for classical learning theory [15]. However, scientific research is unclear about whether expert drivers are better (than non-experts) at assessing their own performance [16- 17]. Moreover, research has indicated that although people can assess their fatigue level in general terms, these assessments are not necessarily accurate the self-assessments are not strongly associated with levels of performance decrement [18-19].

On the other hand, as the employer did not have direct access to the subjective experience of the driver, the employer had to rely on other methods to assess fitness for duty. In this study, the primary method was asking the driver how he felt when he reported for duty. Other issues were implicitly considered during the discussions, such as long working hours and

inadequate time off-duty, as well as the ability of the driver to raise concerns without fear of retribution. In this context, it is interesting to note that the participants considered that the driver's work history was excessive, as research has indicated that an average of 60 hours for a working week is not unusual in the long haul road transport industry in Australia [20].

Some issues that were not related to the facts of the present case (and therefore not relevant to come to a conclusion) were raised by participants in their discussions. These included the use of stimulant drugs and the concept of motive of the parties. These issues warrant further investigation.

Participants' knowledge and perceptions of fatigue were evident from their discussions. In some cases these appear to have been influenced by media reports:

*"Some guy in Britain got [a jail penalty], even more. He fell asleep at the wheel, went off the motorway, went, he was unlucky, went on to a railway line, a passenger train hit him. Yeah, really unlucky, and a coal train came the other way and killed... [Interruption] You're joking!?! [Continues] No. It killed a lot of people, and he got a lot of time [in jail]"*

The participant appears to be referring to the Selby rail crash in the UK where a car, a coal trail and a high speed commuter train crash was attributed to the fatigue of the driver of the car [21].

More frequently, personal experience informed the perceptions and knowledge of participants:

*"I don't think that they should be driving for 10 hours a day. Even if they got home for 10 hours, it's still, you can't go the next day and drive. I mean I drove to Melbourne in the holidays... After driving like two hours and I was like falling asleep. I was really tired, so I don't even see how they can drive long hours."*

The reference to personal experience in the reasoning process may have influenced the perceived culpability of the offence. The scenario was designed to represent a crash with very serious consequences, involving fatalities, and one which might be expected to draw significant punishment. If an individual has personal experience with driver fatigue, they may come to see it as less serious, not wanting to see themselves in the category of someone who has committed a serious criminal offence. This reasoning process might explain the relatively low penalties that participants applied to the defendant (approximately half of their self determined maximum).

That the cause of this serious incident appeared to be downgraded in culpability by the participants is interesting, and indeed in the decision of a recent Victorian non-heavy vehicle fatigue related case [22] on appeal, the court appears to be unwilling to categorize the circumstance that it was faced with as grossly negligent or culpable,

*"the sentence which is imposed for dangerous driving which causes death or serious injury must take account of variations in the moral culpability of those who commit the offence ..., the facts in this case do not suggest any deliberate act, gross negligence or recklessness that endangered others. The cause of this accident was probably only*

*a momentary sleep or a moment of inattention, and that it is the 'dangerousness of the driving' rather than the fatigue per se that justifies the higher culpability. This is an exceptional case of low level moral culpability, constituted of momentary inattention, ..."*

(Emphasis added)

## Conclusion

This study did not find any evidence that supports the argument that there is a general view that a corporation should be held more responsible for fatigue-related truck crashes than an individual driver. The discussions indicated that the way these questions were presented to participants may have oversimplified the matter, and that responsibility was a complex issue that could rarely be resolved down to a responsibility of a driver or of a corporate employer. This "mutual responsibility" approach reflects to some extent the approach underlying Occupational Health and Safety legislation in Australia, and the intent behind the extended (chain of responsibility) offences in the Heavy Vehicle Driver Fatigue reforms that have been recently introduced. In view of the potential weaknesses associated with individuals taking responsibility to self-monitor their level of fatigue, an important question for future research is whether models of shared responsibility for fatigue management are indeed effective in reducing the incidence of fatigue-related crashes and occupational injuries. These models should be compared directly with those that place the responsibility exclusively with the employer.

Three main themes emerged from the questionnaire material and from the discussions. The self-awareness of the driver (coupled with his responsibility to pull over when he was too tired) was a major theme, as were the communication between the driver and his corporate employer, and opportunity to sleep between or during shifts. Although we found no difference between the defendant identity conditions (corporate employer vs individual driver) in the guilt and responsibility variables, participants tended to scrutinize the actions of employers, in particular in relation to their decisions about the employee's fitness to drive. Adoption of policies that clearly specify how such decisions are to be made, and evidence that this has been communicated to drivers would appear to be important steps for employers to take.

Nearly all of the participants agreed that fatigued driving was a serious matter, although the content of the discussions indicates an ambivalence towards the culpability associated with the offence of driving while fatigued. Comments during the discussions such as the ones cited above also indicate that educational campaigns serve an important function in raising awareness about this significant road safety issue. Beyond that, it appears there is a need for more education about management of fatigue, as one of the main points considered by participants was that individuals should be able to accurately assess their level of fatigue and engage in an appropriate response. This assumption is not well supported by scientific evidence and disproportionate reliance upon it may hamper efforts to effectively address fatigue management in the work place.

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<sup>3</sup> This study was conducted in Adelaide. The distance between Adelaide and Melbourne is approximately 800km.

<sup>4</sup> National Transport Commission (Model Legislation – Heavy Vehicle Driver Fatigue) Regulations, 2007