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A comparison of the factors influencing the safety of work-related drivers in work and personal vehicles

Sharon Newnam, Barry Watson, Will Murray
Centre for Accident Research and Road Safety,
Queensland University of Technology

ABSTRACT

There is some evidence to suggest that people who drive for work purposes engage in less safe driving practices than other drivers. This issue was examined by surveying 204 people who drive for work purposes, from four different organisations. It was predicted that work-related drivers would report more unsafe driving behaviours in a work vehicle in comparison to their personal vehicle. In support of this prediction, the participants reported higher crash involvement rates in their work vehicle (per kilometre travelled) than their personal vehicle. The participants were also less likely to engage in vehicle checking practices in their work vehicle compared with their personal vehicle. Contrary to prediction, participants reported that they were less likely to speed or engage in dangerous driving in a work vehicle than their personal vehicle. There was also some evidence that the fleet safety policies and practices in place within each organisation had a positive impact on driver behaviour. The results obtained in this study both confirm and challenge popular beliefs regarding work-related drivers. Replication of these findings with a larger sample of drivers across more diverse vehicle fleets is an important area for future research.

INTRODUCTION

In the literature, work-related drivers are commonly defined as those who drive at least once per week for work-related purposes (Haworth, Tingvall, & Kowadlo, 2000). These drivers range from truck drivers, couriers, police and emergency service drivers, to sales people (Collingwood, 1997). Work-related drivers include senior executives provided with salary sacrificed vehicles, those who drive liveried work-related vehicles both for work and non-work purposes, and those employed to drive fleet cars, vans, or other specialist vehicles (Dimmer & Parker, 1999). Work-related vehicles constitute about 30% of registered vehicles in Australia and because of their high mileage, may comprise up to half of the traffic stream at any one time (Haworth et al., 2000).

Work-related road safety has received increasing attention in recent years, due to the growing awareness of the extent of the issue (Dimmer & Parker, 1999; Downs, Keigan, Maycock, & Grayson, 1999; Haworth et al., 2000; Stradling, 2000). Road crashes have become the most common form of work-related death, injury and absence from work (Haworth et al., 2000). As such, it has become imperative to understand the factors contributing to work-related road crashes so that appropriate interventions can be implemented.

In Australia, there are approximately 40 people killed each month in work-related road crashes (Wheatley, 1997). More recently, a detailed analysis of serious casualty crashes involving commercial vehicles[1] was undertaken in Queensland for the period January 1999 to June 2001 (Meers, 2001). The data indicated approximately a quarter of Queensland's fatal crashes and a sixth of hospitalisation crashes involve at least one commercial vehicle. This is probably due to the characteristics of heavy vehicles and the higher kilometres driven by commercial vehicles. Overseas research has also found that work-related drivers have above average crash frequencies compared to personal car drivers (Lynn & Lockwood, 1998; Downs et al., 1999).

In addition, work-related vehicle crashes place a heavy financial burden on business and the community. Work-related crashes are estimated to cost Australia $425 million each year (Wheatley, 1997). The average cost of a work-related crash is approximately $18,500 with the average time lost from crashes being greater than for any other work

[1] A vehicle was defined as commercial based on observations by the police officer recording the crash. The data is likely to under-represent the number of light vehicles such as cars and utes.

place insurance claims (Stewart-Bogle, 1999). It is therefore a major social and economic issue, which has ramifications at the national as well as the state, local, community, and family level (Wheatley, 1997).

External and Internal Factors Contributing to Crash Involvement

Work-related drivers are exposed to external influences, related to the nature of their job, and internal influences related to their personal dispositions and other individual characteristics which impact on their driving practices. Several factors have been suggested in the literature that could act as important external influences on work-related driver safety. These include high mileage (Collingwood, 1997; Griffith, 1997), time pressures (Downs et al., 1999) and in particular organisational culture (Haworth et al., 2000). In particular, Haworth et al. (2000) suggest that the culture of an organisation can have a significant impact upon attitudes towards driver safety issues and safe driving behaviour, over which drivers have only limited immediate control. A number of factors have been suggested that can motivate organisations to be active in driver safety. These factors include: a strong organisational focus on driver safety, driving as a central business activity, transportation of expensive or dangerous materials, environmental concerns and financial benefits (Downs et al., 1999).

Whilst several important variables have been identified at the organisational level, a number of internal factors influencing safe driving practices have been reported in the literature. The first of these concerns the issue of vehicle ownership in the fleet setting. There is a suggestion that drivers may take less care with work-related vehicles because the vehicles are not owned by the driver, and that there is little or no financial burden for the driver in the case of damage. Therefore, the drivers may take more risks and have a less responsible attitude than if it was their own vehicle (Collingwood, 1997; Masters, 1997; Skewes, 1997). Additional internal influences that have been suggested include an increased likelihood of consuming alcohol and driving, to lose concentration and adopt aggressive practices like tailgating (Donoho, 1996).

Fatigue is also believed to be one of the most important factors contributing to work-related road crashes (Haworth et al. 2000). While external factors like unrealistic work schedules can contribute to fatigue, internal factors like health and fitness can exacerbate the problem. In addition, speeding has been found to be one of the leading contributing factors to work-related crashes (Haworth et al., 2000). In particular, time constraints have been suggested as an influential factor affecting the speed of work-related drivers. Studies have found that it was more important for drivers to get to meetings on time than to obey the speed limit (Adams-Guppy and Guppy, 1995).

Overall, Australian and overseas literature suggests the existence of a work-related driver effect, whereby work-related drivers are over-involved in road crashes and engage in a variety of less safe driving behaviours than the general driving population (Downs et al., 1999; Haworth et al., 2000). However, there is currently no firm evidence confirming the work-related driver effect. One possible means of examining the existence of a work-related driver effect would be to compare the driving behaviour of work drivers in a work vehicle with their driving in a personal vehicle. In particular, such a comparison would identify whether there are external factors operating in each context, which contribute to differences in driver behaviour across the two settings. Therefore, this study aimed to examine whether people drive less safely in a work vehicle compared with their personal vehicle, in terms of both previous crash and traffic offence involvement and current driving practices. In addition, safety policies and practices within organisations were investigated to determine any potential influence they have on driver behaviour.

First, it is predicted that after adjusting for differences in driving exposure, work-related drivers will report a significantly higher involvement in crashes and traffic offences in a work vehicle than their personal vehicle. Second, it is expected that work-related drivers will engage in less safe driving practices in their work vehicle compared with their personal vehicle. Third, it is predicted that work-related drivers employed in organisations with more extensive safety policies and practices will report significantly safer driving behaviours in a work vehicle than those in organisations with less extensive policies and practices.

METHOD

A total of 204 drivers recruited from four organisations volunteered to participate in the study. The sample consisted of 80% males and 20% females. The overall response rate for the survey was 53%. The organisations were selected to provide a wide representation of different types of driving fleets, including; the oil/petrol industry (I), local government organisations (II and IV) and a tertiary institution (III). The participants were selected for inclusion in the study based on two criteria: (i) they drove a company owned vehicle for work-related purposes at least once a week, and (ii) they owned a personal vehicle driven for non work-related purposes.

A questionnaire was developed for the study, which collected a variety of information relating to the participants' behaviour in relation to both their work driving and personal driving. Section one elicited information regarding

general driving behaviour. Items included in this section related to how many days the participants drove each week, how many hours they drive each week, and kilometres driven per year. The participants were required to respond to the items on a six-point scale.

Section two comprised fourteen items relating to safety policies and practices within organisations. The items were adapted from previous fleet safety work (Murray & Dubens, 2000; Queensland Transport, 1999). This section was designed to gauge participants' perceptions towards their organisation's policies and practices relating to driver safety. The participants were required to answer the items by responding, 'yes = 1', 'no = 2', or 'unsure = 3'.

Section three was designed to measure current driving practices in a variety of different situations and vehicle maintenance procedures. Twenty-eight items were measured on a 7 point Likert scale 1(very unlikely) to 7 (very likely). The majority of the items were adapted from the Driver Behaviour Questionnaire (DBQ) (Reason et al., 1990) which has been shown to have a high internal reliability above .80. Additional items were adopted from the research literature, experts in the field, and responses obtained from pilot research conducted with a group of fleet drivers. Section four elicited demographic information regarding, gender, age and driving experience.

The questionnaires were administered to participants via the internal mail system of each organisation. The responses provided were completely confidential, and no identifying information was made available to their employer. Due to the human resource implications for the organisations, it was not feasible to undertake a non-response follow-up. The data was analysed using SPSS for Windows version 10.

RESULTS

The majority of the sample were in an older age group ranging from 40-59 years of age. The majority of drivers had at least 20 years driving experience, and reported driving more than 20 000 kilometres per year in a work vehicle and 10 000 kilometres or less in their personal vehicle.

A comparison of work and personal vehicle crash rates

As would be expected, there were wide variations in the amount of travel undertaken by participants in a work and personal vehicle. Therefore, to meaningfully examine the relative crash involvement of drivers in the two settings, it was necessary to adjust for driving exposure. This was achieved by dividing the number of crashes reported by each participant (using a midpoint for the category), during the time period they had been working for their current employer, with the reported kilometres travelled in both a work and personal vehicle. Based on this method, a crash rate per 1000 kilometres travelled was derived for both work driving and personal driving for each participant.

A sign test was then employed to compare the reported crash rate for work-related driving, with the reported rate for personal driving. The results revealed that a higher crash rate was reported in a work vehicle ($M = .07$, $SD = .16$) in comparison to a personal vehicle, ($M = .06$, $SD = .21$), z ($N = 199$) = -1.98, $p < .05$. A similar analysis indicated that there was no significant difference in the rate of offences reported between a work ($M = .04$, $SD = .11$) and personal vehicle ($M = .09$, $SD = .23$), (ns).

A comparison of driving practices in a work and personal vehicle

Prior to comparing the self-reported driving behaviours across the two driving settings, it was decided to conduct a factor analysis. This served two purposes. First, it avoided the inflation of the alpha rate, which would have resulted from conducting multiple statistical tests. Second, it allowed an exploration of the underlying dimensions characterising driver behaviour in the two settings.

Principal components extraction was initially performed to estimate the number of factors and the factorability of the correlation matrix. Examination of the eigenvalues and the scree plot revealed a four factor solution for both a work and personal vehicle. A promax rotation confirmed a four factor solution, with 43.47% of the variance explained in a work vehicle and 43.26% of the variance in a personal vehicle. Tables 1 and 2 present the variable loadings on each of the four factors for a work and personal vehicle, respectively. Each of the 25 items used in the analyses loaded on the four factors similarly in the two settings.

Table 1.
Factor Analysis of Driving Behaviours Reported in a Work Vehicle

	Factors			
Questionnaire items	1	2	3	4
Involvement in unofficial races	.84			
Overtake without checking mirror	.78			
Flash the car in front	.74			
Hit something when reversing	.70			
Show aggression	.68			
Become angered with another driver and give chase	.62			
'Wake up' and find yourself at another destination	.59			
Drive while over the legal blood-alcohol limit	.57			
No clear recollection of the road travelling along	.49			
A dislike for a type of road user and indicate hostility	.48			
Become stressed and agitated	.41			
Exceed the speed limit more than 10 kph on urban roads		.79		
Exceed the speed limit more than 20 kph on urban roads		.72		
Exceed the speed limit more than 10 kph on open roads		.73		
Exceed the speed limit more than 20 kph on open roads		.82		
Deliberately disregard the speed limit		.43		
Drive the car fairly hard			.65	
More likely to be in a rush			.62	
Accelerate quickly away from the traffic lights			.57	
Drive while tired			.50	
Travel above the speed limit without realising			.41	
Test out the performance of the car			.39	
Lose concentration while driving			.37	
Check the water in the radiator				.89
Check the pressure in the tyres				.71

Table 2.
Factor Analysis of Driving Behaviours Reported in a Personal Vehicle

	Factors			
Questionnaire items	1	2	3	4
Involvement in unofficial races	.70			
Overtake without checking mirror	.81			
Flash the car in front	.62			
Hit something when reversing	.79			
Show aggression	.59			
Become angered with another driver and give chase	.38			
'Wake up' and find yourself at another destination	.79			
Drive while over the legal blood-alcohol limit	.44			
No clear recollection of the road travelling along	.46			
A dislike for a type of road user and indicate hostility	.49			
Become stressed and agitated	.47			
Exceed the speed limit more than 10 kph on urban roads		.84		
Exceed the speed limit more than 20 kph on urban roads		.78		
Exceed the speed limit more than 10 kph on open roads		.76		
Exceed the speed limit more than 20 kph on open roads		.80		
Deliberately disregard the speed limit		.37		
Drive the car fairly hard			.58	
More likely to be in a rush			.50	
Accelerate quickly away from the traffic lights			.76	
Drive while tired			.62	
Travel above the speed limit without realising			.46	
Test out the performance of the car			.43	
Lose concentration while driving			.43	
Check the water in the radiator				.86
Check the pressure in the tyres				.75

Items forming factor 1 were internally consistent with a high Cronbach's alpha of .88 for a work vehicle and .87 for a personal vehicle. Factor 1 was well defined and appeared to be reflecting a dangerous driving dimension. Factor 2 was well defined and internally consistent with a high Cronbach's alpha of .84 for both a work and personal vehicle. This factor was consistent with a speeding dimension. Factor 3 was internally consistent with a moderate Cronbach's alpha of .74 for a work vehicle and .75 for a personal vehicle. This factor appeared to be consistent with a dimension relating to exceeding normal driving limits. Factor 4 was internally consistent with a moderately high Cronbach's alpha of .81 for a work vehicle, and .79 for a personal vehicle. This factor was consistent with a vehicle checking dimension.

Four paired sample t-tests were conducted on the composite scores for each of the four factors comparing self-reported driving practices in a work and personal vehicle. A significant difference in driving practices appeared within three of the four factors. The results revealed that drivers were more likely to report engaging in those driving practices included in the dangerous driving dimension while driving their personal vehicle, compared with their work vehicle, t (201) = -5.02, $p < .001$. Similarly, drivers were more likely to report engaging in speeding behaviour in a personal vehicle, than a work vehicle, t (201) = -6.89, $p < .001$. In contrast, drivers were less likely to report engaging in vehicle checking practices in a work vehicle in comparison to a personal vehicle, t (201) = 6.99, $p < .001$. Exceeding normal driving limits was not found to be significantly different between a work and personal vehicle, (ns).

The impact of safety policies and practices

The responses to the items in Section 2 of the questionnaire were summated to form a composite score, ranging from 14 (awareness of policies and practices within the organisation) to 42 (unsure of policies and practices within the organisation). A one-way ANOVA conducted on this data found a significant difference between the organisations in relation to their safety policies and practices, F (3, 198) = 32.09, $p < .001$, $\eta^2 = .33$. Post hoc analysis (Tukey a) found that Organisation I had significantly better reported safety policies and practices than the other organisations.

In order to examine the impact of safety policies and practices across organisations on driver behaviour a second one-way ANOVA was performed on a composite score for the self-reported driving practices. The results found a significant main effect for reported driving behaviour in a work vehicle across organisations, F (3, 198) = 4.94, p < .05, η^2 = .07. Post hoc analysis (Tukey a) revealed a significant difference between reported driving behaviour in a work vehicle in Organisation I in comparison to the other organisations.

Discussion

The results both confirm and challenge popular beliefs regarding work-related drivers. After adjusting for driving exposure and the period in which the drivers had been employed at their current organisation, it was revealed that drivers report more crashes in a work vehicle in comparison to their personal vehicle. Contrary to expectation, it was found that work-related drivers were generally more likely to report safer driving practices in a work vehicle. In particular, it was found that drivers were less likely to speed and drive dangerously in a work vehicle than their personal vehicle. These findings appear inconsistent with previous research that has found speeding to be the most commonly reported illegal behaviour among work-related drivers (Dimmer & Parker, 1999). Further, dangerous driving has been found to be a contributing factor in work-related crashes (Donoho, 1996).

There are a number of possible explanations for these findings. First, the work-related driver effect may be suppressed or ameliorated in the particular organisations that responded to the questionnaire. The drivers who participated in the study were from organisations that have an active interest in improving their safety policies and practices. Thus, it is possible that the existence of the work-related driver effect may not be as evident in the current sample, as it would be in those organisations with less emphasis on fleet safety policies and practices. Second, the majority of the sample fell within an older age group with more years of driving experience. It has been suggested that these demographic characteristics are indicative of a sample less likely to engage in high risk driving practices. In support of this argument, Adams-Guppy and Guppy (1995) found speeding to be associated with younger less experienced drivers in their sample of work-related drivers. However, it is unclear how the older profile of the sample would have influenced the results relating to work driving more than personal driving.

Although drivers were generally found to report safer driving behaviour in a work vehicle, the same care was not reported in relation to vehicle checking. This finding may be indicative of a factor found to contribute to the work-related driver effect. It has been suggested that vehicle checking is generally inadequate in less regulated organisations (Haworth et al., 2000). Thus, it is interesting that less attention to vehicle checking was also found in the relatively well managed fleets (in terms of safety policies) participating in the current study.

No evidence was found to suggest that drivers exceeded normal driving limits in a work vehicle in comparison to their personal vehicle. Traditionally, it has been believed that work-related drivers have higher crash rates because they are exposed to time pressure which in turn results in elevated driving speeds (Grayson, 1999). In support, Adams-Guppy and Guppy (1995) found a measure of time-urgency to be a strong predictor of speeding. These findings could suggest that the organisations surveyed may have a significant influence in discouraging speeding, or managing efficient time schedules for their employees. Alternatively, the driving tasks of the organisations in the current study may not be inherently stressful or fatiguing.

The results revealed that Organisation I's drivers reported that there were significantly more extensive policies and practices in place within their organisation. The apparently strong safety culture in Organisation I was also evidenced by the finding that its drivers reported overall safer driving behaviour in a work vehicle. This result supports other research suggesting that a strong safety culture can encourage safer attitudes and behaviour towards work-related driving (Downs et al., 1999). Although all the organisations participating in the study were found to be pro-active to some degree in their approach towards driver safety, Organisation I's approach may be attributed to their reliance on the distribution of dangerous and expensive material (oil/petrol) as their core business. This is supported by a US-based study, which found that fleets carrying hazardous materials had a superior safety record compared with non-hazardous fleets (Abkowitz et al., 2001).

Practical implications

A number of practical implications have emerged from this research for organisations implementing or restructuring safety policies and practices. A key aspect that emerged is the importance of the integration of policies and practices into a strong safety culture within an organisation. In particular, there appears to be evidence that the safety culture in the organisation had a significant influence on behaviour when driving a work vehicle. Thus, interventions promoting a strong safety culture may prove to be an effective strategy to decrease the work-related crash rate.

Work-related drivers were less likely to report engaging in vehicle checking procedures in a work vehicle. Organisational policies may need to focus on improving this aspect, to increase the safety standards for their employees. Although speeding, dangerous driving behaviours, and exceeding normal driving limits appeared to play less of a role in work driving than personal driving, these issues still need to be regarded as potential factors contributing to work-related crashes.

Limitations

Despite its practical applications, the current study has a number of limitations. The range of behaviours examined may not be fully indicative of the behaviours that are problematic in the work setting. For example, it has been suggested that other factors such as seat belt wearing may contribute to the higher injury risk of work drivers (Meers, 2001), although this did not emerge in the pilot phase of the project as an important factor.

The organisations used in the current study were all relatively active in promoting safety among their employees. This could potentially have represented a bias towards safe driving in a work vehicle. Moreover, there are constraints in generalising the results to all work drivers owing to this bias and the relatively small sample size.

Recommendations for future research

Based on the results and the above mentioned limitations a number of priorities for future research have been identified. Future studies should investigate, in depth, the unique factors influencing work-related driver behaviour. There may be a number of additional influences contributing to the work-related driver effect, which have not been captured in this study. Detailed case studies conducted via interview techniques would need to be performed on a range of organisations to maximise the chances of identifying further contributing work-related factors.

Future research should attempt to involve organisations that do not emphasise a strong safety culture for work-related drivers. It is suggested that the inclusion of such organisations may provide crucial information regarding the differences in the behaviour of work-related drivers in organisations with less emphasis on safety policies and practices. Therefore, such a sample would increase the likely range of behaviours reported by drivers in the work setting.

CONCLUSION

The key finding that has emerged from the study is that driver behaviour can vary across work and personal settings. There was some support for the notion that people drive a work vehicle less safely than a personal vehicle. However, contrary to previous research these results were not consistent with the reported current driving practices, where drivers tended to report engaging in more safe driving practices in their work vehicle than their personal vehicle. The exception to this related to vehicle checking practices, which drivers reported that they were less likely to undertake in a work vehicle. Together, these results suggest that external factors may be influencing driver behaviour in different ways across the two settings. In addition, more extensive safety policies and procedures appeared to positively contribute to safe driving practices. Although these findings have not fully supported previous research, this study provides a strong foundation for future investigation into the complex and inter-related range of factors contributing to unsafe driving behaviours among work-related drivers.

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