

IMPLEMENTATION OF A DRIVING DIARY INTERVENTION TO REDUCE ABERRANT DRIVING BEHAVIOURS

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Summary: Crash data involving taxis indicates that such drivers are over represented in crashes and are one to two times more likely to be involved in a fatality crash. This study reports on the pre intervention survey to provide a baseline measure of the self-reported attitudes and corresponding driving behaviours of a sample of taxi drivers. Results indicate that some taxi drivers willingly admit to engaging in unsafe driving practices. In addition, preliminary results of a post intervention survey revealed that taxi drivers' safety perceptions, attitude and behaviours improved after completing a Driving Diary intervention.

INTRODUCTION

International research based on taxi road safety is scarce. Likewise, no substantial or recent international statistics relating to taxi driver crashes or fatalities are evident within published literature. However, within the state of Queensland, Australia in the 2000/01 financial year there was, on average, 80 third party insurance claims per 1000 taxis (Stewart et al., 2006), compared to a rate of less than 5 claims per 1000 cars. Further research revealed that taxis were approximately 16 times more likely to be involved in a tow away crash and were approximately 4.5 times more likely to be involved in a fatality than other vehicles on register (Staysafe 36, 1997). Additionally, taxi drivers were somewhere between 1 and 2 times more likely to be involved in a fatality than other drivers.

The Driving Diary Concept

Basically, the driving diary is a brief intervention designed primarily to target high risk drivers that have been identified through traffic infringements, especially speeding, and work-related crashes. The intervention aims to reduce the incidence of dangerous driving practices committed by the employee through the use of a diary. The employee records in the diary the type and frequency of traffic violations they commit, and are then required to reflect and comment on their behaviour. Based on the Transtheoretical Model (DiClemente & Prochaska, 1998) of behaviour change, it is through this increased awareness that employees perceive themselves at increased risk, thereby facilitating their progress towards behaviour change. The driving diary is based upon brief intervention techniques used successfully in the health care arena over the last twenty years, and thus the tool aims to reduce engagement in unsafe driving practices. While it is acknowledged that the diary concept is not new, the use of a diary as a behaviour change strategy in a work-related road safety setting is novel. Daily completion of the driving diary would take participants approximately 10 minutes each day, usually at the end of the work day, for 10 working days. Importantly, one of the primary aims is to identify when and where high risk driving behaviours occur and what feelings and emotions are associated with the event. By

engaging in this process it is anticipated that participants will gain a greater level of understanding regarding their driving habits and high risk times, which will ultimately help them improve their own driving behaviour.

Self-Report Driving Measurement Tools

While a number of measurement tools have recently been developed to examine individuals' driving behaviours, the Manchester Driver Behaviour Questionnaire (DBQ) (Reason et al., 1990), and Driver Attitude Questionnaire (DAQ) (Parker et al., 1996) remain the predominant tools to assess general motorists' driving attitudes and outcomes. Within the fleet context, the Safety Climate Questionnaire (SCQ) (Glendon & Litherland, 2001) is increasingly being utilised in work-related environments to determine the effect of safety rules, procedures, communication and support as well as management commitment on self-reported aberrant driving behaviours (Davey et al., 2006). In addition, the Driver Perception of Pressure questionnaire (DPP), developed specifically for this study, is a measure to determine the degree by which taxi driver's believe or perceive they are under pressure or pushed to engage in aberrant driving behaviours. However, despite the considerable exposure on public roads, relatively little research has endeavoured to examine the self-reported driving behaviours of taxi drivers. In addition, little research could be found that examines the influence of safety interventions or countermeasures on taxi driver behaviours. As a result, the study aimed to:

- a) to utilise pre and post intervention surveys to examine a group of taxi drivers' attitudes and behaviours regarding road safety issues via four measurement tools (i.e., DBQ, DAQ, SCQ & DPP); and
- b) investigate the effect of the driving diary intervention on a group of taxi drivers.

METHOD

Part 1: Pre-Intervention Survey

The pre-intervention survey was utilised to provide a baseline measure of current taxi driver attitude and behaviours. Also, the survey identified specific aberrant driving behaviours enabling reliable intervention selection. A group of Australian taxi drivers ($N = 182$) from a north Queensland region volunteered to participate in the study. In total there are approximately 480 licenced taxi drivers in the survey region indicating a response rate of 38 percent. However, of the 480 registered taxi drivers, a lesser proportion of taxi drivers are current operational drivers. Therefore, the response rate may be considerably more than the stated 38 percent. Unfortunately, due to the number of individual taxi vehicle owners and the unavailability of some drivers, a final response rate could not be accurately determined.

Due to the nature of work for most taxi drivers, time for completing a survey is restricted to breaks between obtaining fares. Therefore, to encourage taxi drivers to participate in the survey and ensure completion rates, the various survey questionnaires were reduced in length to reduce the time required to complete the survey. Factor analytic procedures combined with an examination of alpha coefficients were implemented to develop abbreviated assessment tools.

Part 2: Intervention Implementation and Post Intervention Survey

A total of 100 Driving Diaries with letters of introduction and instruction for use were provided to the taxi organisation management. Subsequently, the taxi organisation provided taxi owners with the Driving Diaries for further distribution to taxi drivers.

Utilising the same survey, with additional questions regarding driving diary participation, 85 taxi drivers volunteered to complete the survey. Of the 85 follow up surveys, 41 participants had indicated that they had previously participated in the Driving Diary program. However, of the 41 participants in the second survey that had reported undertaking the Driving Diary program only 24 participants could be matched to have also completed the first survey. The small sample size will be discussed further within the discussion section of this paper.

RESULTS

Part 1: Pre-Intervention Survey

Cronbach's alpha reliability coefficients were utilised to calculate the internal consistency of the abbreviated SCQ, DBQ, DAQ and DPP scores, which are presented in Table 1. The SCQ factors, which specifically relate to the safety climate of the organisation, appear to exhibit high overall level of internal consistency. Similar to previous research (Dobson et al., 1999), and on professional drivers (Davey et al., 2006; Sullman et al., 2002), the DBQ factors also appear to exhibit relative internal consistency. In contrast, there has been little research to determine the psychometric properties of the DAQ, and although only moderate, the alpha coefficients are similar to previous research (Davey et al., 2006; Meadows, 2002). Cronbach's Alpha reliability coefficients for the two sub-factors in the DPP scale were quite robust.

Table 1. Survey Alpha Reliability Coefficients, Means & Standard Deviations

Measurement Scale		Alpha	<i>M</i>	SD
SCQ-MD				
Fleet Safety Rules	(2 items)	.81	5.59	1.41
Communication & Support	(2 items)	.75	5.20	1.51
Work Pressures	(2 items)	.82	5.26	1.40
Adequacy of Procedures	(2 items)	.82	5.61	1.46
Management Commitment	(2 items)	.81	5.69	1.36
DBQ				
Errors	(4 items)	.78	1.86	.80
Highway Code Violations	(4 items)	.77	1.89	.99
Aggressive Violations	(2 items)	.56	2.03	1.14
DAQ				
Alcohol	(3 items)	.67	6.40	1.04
Close Following	(3 items)	.55	5.75	1.39
Overtaking	(3 items)	.67	5.93	1.29
Speeding	(3 items)	.67	4.39	1.89
DPP				
DPP Negative	(10 items)	.91	2.58	1.32
DPP Positive	(4 items)	.75	3.46	1.56

Table 1 also reports the overall mean scores for the factors within the four scales. A higher mean for the DBQ represents more active engagement in aberrant driving behaviours in the last 6 months. However, a higher mean for the SCQ and DAQ reveals a more appropriate attitude towards road safety and the safety climate within the organisation. In addition, a lower mean for the DPP-Negative factor reveals a more safe perception of pressure, whereas a higher mean for the DPP-Positive represents a more safe perception of positive-type pressure. The mean scores for both factors indicate that taxi drivers' perception of pressure may influence their ability to drive safely. Examination of the mean scores indicates that of the four DAQ driving behaviours, participants were most likely to report that speeding was an acceptable behaviour ($M = 4.39$). In addition, the results indicate that drink driving is perceived as the most serious offence in the current sample ($M = 6.40$), and similar to previous research (Davey et al., 2006), speeding is often perceived as an acceptable behaviour in some circumstances. Between-group analyses identified few meaningful differences within the DBQ or SCQ scales.

Intercorrelations between Variables. Strong relationships appeared evident between the DBQ factors, with the strongest bi-variate relationship identified between highway-code violations and errors ($r = .66^{**}$). For example, those who engaged in highway-code violations (i.e., speeding) were also more likely to commit errors while driving. A similar significant bi-variate relationship was identified between highway-code and aggressive violations ($r = .65^{**}$). For example, those who engaged in speeding violations were also more likely to exhibit aggressive acts while driving. Similar relationships were identified between the DAQ factors, with the highest correlation being between close following and risky overtaking ($r = .70^{**}$). That is, those who reported an unwillingness to engage in risky overtaking manoeuvres were also unlikely to perceive close following as an acceptable driving behaviour. In contrast, to previous research (Davey et al., 2006) strong correlations were generally evident between the SCQ factors, with the highest correlations being between adequacy of procedures and both communication and support ($r = .74^{**}$) and management commitment ($r = .71^{**}$).

In regards to bi-variate relationships between the questionnaires, positive correlations were identified between the DBQ and DPP factors, as the perception of negative-type pressure increases, so do the levels of self-reported aberrant driving behaviour. For example, the DPP-Negative was positively correlated with driving errors ($r = .49^{**}$), highway violations ($r = .68^{**}$) and aggressive violations ($r = .40^{**}$). In regards to the association between DAQ and DPP factors, correlations were evident between questionnaires, with the strongest relationships being between the DPP-Negative and the DAQ factors, overtaking ($r = -.51^{**}$), close following ($r = -.51^{**}$) and speeding ($r = -.41^{**}$). In addition, significant negative correlations were evident between all the DBQ and DAQ sub-factors (i.e., behaviours vs attitudes), as those who perceived aberrant driving behaviours such as speeding as serious were subsequently less likely to actually engage in such behaviours over the previous six month period (i.e., $r = -.42^{**}$). Similar negative correlations were identified between the DBQ and SCQ factors, as the positive work environment which provided fleet safety rules, procedures and support resulted in lower levels of self-reported aberrant driving behaviour. For example, management commitment was negatively correlated with driving errors ($r = -.27^{**}$), highway violations ($r = -.31^{**}$) and aggressive violations ($r = -.28^{**}$). In regards to the association between DAQ and SCQ factors, weaker correlations were identified with the strongest relationship being between overtaking and management commitment ($r = .31^{**}$).

Part 2: Post Intervention Survey

Analysis revealed that only 24 taxi drivers completed both the pre and post surveys and participated in the Driving Diary program. Utilising the pre and post survey results from the 24 participants, the analysis aimed to assess if any changes to participant perception of safety climate, driver perception of pressure, work-related road safety attitudes and behaviours were evident after the implementation of the Driving Diary program. For this paper, the analysis is only presented in relation to mean scores and due to the small sample size ($n = 24$) all differences should be considered with these limitations in mind. Table 2 shows the mean scores and standard deviations for the DBQ, DAQ, SCQ and DPP questionnaire subscales. Results revealed considerable differences in mean scores for the 24 taxi drivers who completed both the pre and post surveys as well as participated in the Driving Diary program. The taxi drivers ($n = 24$) who completed the Driving Diary program reported considerably safer behaviours and attitudes, and safer perceptions of safety climate and driver pressure.

Table 2. Post Intervention Survey Means & Standard Deviations

Questionnaire Subscales	April 2007		November 2007	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
DBQ				
Errors	2.34	.89	2.21	.70
Highway Code Violations	2.65	1.32	2.20	.73
Aggressive Violations	2.75	1.31	2.33	.84
DAQ				
Alcohol	6.22	1.08	6.51	.79
Close Following	4.80	1.40	5.23	.95
Overtaking	4.70	1.47	5.27	1.11
Speeding	3.05	1.49	4.25	.78
SCQ-MD				
Safety Rules	4.83	1.72	5.41	1.34
Communication & Support	4.15	1.55	5.16	1.21
Work Pressure	4.80	1.11	5.37	1.16
Adequacy of Fleet Safety Procedures	4.45	1.71	5.17	1.17
Management Commitment	4.63	1.06	5.33	.85
DPP				
DPP Negative	3.21	1.31	2.82	1.07
DPP Positive	3.53	.93	3.59	1.15

DISCUSSION

This paper aimed to report on the utilisation of a range of self-report driving measurement tools (e.g., DPP, SCQ, DAQ & DBQ) to conduct an investigation into the driving attitude and behaviours of a group of taxi drivers. In addition, the research aimed to investigate whether taxi drivers' attitudes and behaviours regarding road safety issues improved after the implementation of the Driving Diary intervention. Currently, only a small body of research has examined the self-reported driving attitudes and behaviours of work-related drivers (Davey et al., 2006; Davey et al., 2007; Sullman et al., 2002), with considerably less research focusing on the driving conduct of taxi drivers despite the potential for such data to be utilised in work-related road safety interventions designed to reduce the burden of aberrant driving behaviours and crash involvement.

Examination of the pre-intervention survey mean scores for the DBQ, DAQ, SCQ and DPP factors revealed that participants generally reported positive attitudes and behaviours towards road safety. However, consistent with previous research, this study identified speeding as the most common form of aberrant driving behaviour reported by drivers (Davey et al., 2007; Parker et al., 1995). Therefore, it appears that taxi driver's core risky driving behaviour is similar to that of other fleet drivers e.g., speeding. In addition, taxi drivers reported that pressures (specifically negative type pressures) placed upon them by the organisation, customers and other external factors, influenced their ability to drive safely.

Relationships between the measurement tools revealed negative associations between attitudes and the corresponding behaviours. That is, participants who agreed with the seriousness of the specified aberrant driving behaviours were less likely to report engaging in such behaviours over the past six months. In addition, bi-variate correlations also provided a preliminary indication that the safety climate of the organisation, in particular the direction provided by the management team, is associated with driving behaviours. For example, the collected data generally indicates that the current organisation provided relatively clear fleet safety rules, adequacy of fleet safety procedures as well as strong management commitment, which was negatively associated with engaging in the aberrant driving behaviours. Similar to previous research (Wills et al., 2007), the results indicate that the safety climate of a taxi company or organisation has the potential to directly impact upon the driving outcomes exhibited by employees. Bivariate correlations also provided a preliminary indication that driver perception of negative-type pressure is associated with driving behaviours. For example, the collected data generally indicates that taxi drivers with a greater perception of pressure are more likely to partake in aberrant and risky driving behaviours.

Although preliminary, positive results were revealed from the post intervention survey mean scores. For example, taxi drivers ($n = 24$) who participated in the Driving Diary program reported considerably safer behaviours and attitudes, and safer perceptions of the safety climate and driver pressure issues. However, the results discussed within this paper need to be taken within the context of the limitations in relation to 1) sample sizes of the post driving diary survey and participants that participated in the driving diary activity; and 2) the short time lapse between the pre and post surveys. Furthermore, in relation to the small number of taxi drivers who participated in the Driving Diary program, the study showed conclusively that the Driving Diary should not be just handed to drivers to complete, rather be accompanied with either a workshop or with further training, etc (highlighting work-related road safety and the benefits of the driving diary). Any future work related road safety initiatives and strategies should incorporate a multi-faceted approach targeting not only identified high risk sections but also provide a general plan of work related road safety applicable to the overall organisation. However, it should be noted that the taxi organisation still continue to utilise the Driving Diary within their new driver training. Together with a more thorough inclusion of work-related road safety concepts within their program, the taxi organisation are utilising the Driving Diary as a practical component for drivers, supervised by the organisation's trainer.

In summary, the results may prove to have direct implications for taxi driving operations, not only through supervising and monitoring the driving performance of drivers, but also through proactive measures to reduce the risk to drivers and supporting positive driver attitude and behaviours. Importantly, preliminary results also indicate that the Driving Diary intervention

may have beneficial implications toward the reduction of taxi driver aberrant driving behaviours, attitudes and promoting safer perceptions in relation to safety climate and driver pressure. However, further research is required to assess the Driving Diary as a potential strategy for driver behaviour change.

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