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AN APPLICATION OF THE DRIVER BEHAVIOUR QUESTIONNAIRE IN AN AUSTRALIAN ORGANISATIONAL FLEET SETTING

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This study reports on the utilisation of the Manchester Driver Behaviour Questionnaire (DBQ) to examine the self-reported driving behaviours of a sample of Australian fleet drivers ($N = 443$). Surveys were posted to participants who agreed to participate in the study. Factor analysis techniques identified a three factor solution which supports previous research that has demonstrated distinctions between different driving practices (e.g., errors, highway code violations and aggressive driving violations). However, a larger number of items traditionally related with highway code violations were found to be associated with aggressive driving acts among the current sample. Additional analysis revealed that the DBQ factors were negatively related with self-reported traffic offences, although at a multivariate level only the number of kilometres driven each year (i.e., exposure) proved to be predictive of incurring fines/demerit points. This paper further outlines the major findings of the study and highlights implications regarding the utilisation of the DBQ within fleet settings to examine on-road behaviour among professional drivers.

Key words: Driver Behaviour Questionnaire (DBQ), fleet drivers, road safety.

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Present Context

Recent research indicates that a growing number of motorists are being exposed to aggressive, violent and/or reckless behaviours on public roads (Joint, 1995; Lajunen, Parker & Stradling, 1998; Underwood et al., 1999). These behaviours are a concern as a considerable body of evidence is now demonstrating a link between aggressive driving violations and increases in the risk of crash involvement (Dobson et al., 1999; Parker et al., 1995; Reason et al., 1990; Underwood et al., 1999). For instance, intentional driving violations have been found to be a significant predictor of involvement in vehicle accidents (Parker et al., 1995). As a result, a considerable body of research is presently focusing on identifying the causes of aggressive and violent driving behaviours (Lajunen & Parker, 2001; Lajunen et al., 1998; Underwood et al., 1999) and the subsequent impact these behaviours have on road safety (Parker et al., 2000; Parker et al., 1995; Sullman et al., 2002).

Driver Behaviour Questionnaire

A number of measurement scales designed to examine the factors associated with aggressive driving behaviours have been developed, such as the Driver Anger Scale (Deffenbacher, Oetting & Lynch, 1994), the Driving Skill Inventory (Lajunen & Summala, 1997), and the Manchester Driver Behaviour Questionnaire (DBQ) (Reason et al., 1990). The latter questionnaire has recently become one of the most widely implemented measurement scales to examine self-reported driving behaviours (Lajunen & Summala, 2003). The original DBQ, developed by Reason et al (1990), focused on two distinct behaviours that were named errors and violations. Errors consist of actions that are not planned while violations were considered to be deliberate deviations from safe driving practices. Although the main distinction between the concepts is the issue of deliberate versus accidental behaviour, it is noted that both factors are potentially dangerous (Lajunen, Parker & Summala, 2003). However, an additional factor named “slips and lapses” was also identified that focuses on attention and memory failures, which were not considered to effect driving safety. For example, lapses

may reflect behaviours associated with memory and attention problems, while errors include more serious mistakes such as failures of observation and misjudgements (Lajunen & Summala, 2003).

The original scale has since been modified by Lawton et al. (1997) to include additional items to assess other factors contributing to driver violations. Specifically, aggressive violations are proposed to be associated with an interpersonally aggressive component while “ordinary” violations do not have an aggressive aim, but are still deliberate violations (Lajunen et al., 2003). More specifically, the scale distinguishes two classes of violations that are Highway code violations which consist of behaviours such as speeding and running red lights compared to Interpersonal aggressive violations such as sounding one’s horn or chasing another motorist when angered (Lawton et al., 1997). Furthermore, Highway code violations focus on “gaining advantage” (e.g., speeding, overtaking) while interpersonal violations are more hostile in nature and may include running red lights and forcing one’s way out from a minor road (Lawton et al., 1997).

The DBQ has been utilised extensively in driver safety research in areas such as: the genetics of driving behaviour (Bianchi & Summala, 2004), age differences in driving behaviour (Dobson et al., 1999), issues associated with self-report bias (Lajunen & Summala, 2003), cross cultural studies (Lajunen et al., 2003) and associations with the likelihood of being involved in an accident (Dobson et al., 1999; Mesken, Lajunen & Summala, 2002; Parker et al., 1995; Reason et al., 1990). In addition, the DBQ has been successfully implemented in a number of countries including: Finland (Bianchi & Summala, 2004; Mesken et al., 2002), Netherlands (Lajunen et al., 2003), United Kingdom (Parker et al., 2000), New Zealand (Sullman, Meadows & Pajo, 2002), China (Xie & Parker, 2002) and Australia (Dobson et al., 1999; Newnam, Watson & Murray).

In regard to the number of DBQ factors identified, previous research has either confirmed the original three factors of errors, violations and lapses (Aberg & Rimmo, 1998; Blockey &

Hartley, 1995; Parker et al., 1995) four factors that are errors, lapses, aggressive and ordinary violations (Sullman et al., 2002), or five factors (Parker et al., 2000). In addition, it is noted that differences have been noted in the factor structure. For example, Aberg and Rimmo (1998) identified inattention and inexperience error factors from a large group of Swedish drivers, but overall found the same factor structure. Lajunen et al. (2003) reported four factors with a group of UK drivers ($N = 831$), which was similar to Mesken et al. (2002) who identified errors, lapses, speeding violations and interpersonal violations with a group of Finish drivers. Similarly, Xie and Parker (2002) investigated professional drivers in China and reported four quite distinct factors. For the Australian context, Blockey and Hartley (1995) and Dobson et al. (1999) reported the same original three factors as Reason et al. (1990), but Blockey & Hartley (1995) named the factors as general errors, dangerous errors and dangerous violations. Notwithstanding the general consistency of the factor structure, cross-cultural implementation of the DBQ has highlighted different “national scoring keys” and changes in the number of items used in the scale, and the wording of some questions (Lajunen et al., 2003).

Professional Drivers and Fleet Safety

Despite the prevalence of professional drivers on public roads, relatively little research has endeavoured to examine the self-reported driving behaviours of those who drive company sponsored vehicles and/or spend long periods of time behind the wheel (Newnam et al., 2002; Newnam et al., 2004; Sullman et al., 2002; Xie & Parker, 2002). At present, a small body of research has demonstrated company car drivers are at a greater risk of accident involvement (Newnam et al., 2002; Sullman et al., 2002), not only through higher levels of exposure to the road environment, but also time and scheduling pressures, and other distractions (Stradling et al., 2000). For example, Newnam et al. (2002) utilised aspects of the DBQ to investigate the driving behaviours of 204 individuals who drove for work purposes and identified that participants reported higher crash involvement in their work vehicle compared to private vehicle, and were less likely to engage in vehicle safety checking practices e.g., tyre pressure.

Despite the limited amount of research in this area, similar to above, one issue to emerge from the current research is the variation in the number of identified DBQ factors. For example, research that has focused on taxi, bus, and company drivers have identified three factors (Xie & Parker, 2002), truck driving research has demonstrated four factors (Sullman, Meadows & Pajo, 2002), and earlier research that has focused exclusively on drivers of company vehicles have reported six factors (Dimmer & Parker, 1999).

In regard to fleet safety within Australia, research has yet to utilise the complete DBQ to examine large groups of professional drivers' self-reported driving to; (a) determine drivers' self-reported driving behaviours and (b) the relationship such behaviours have with accident involvement rates. Australian research that has utilised the DBQ scale has focused on either the driving characteristics of women only (Dobson et al., 1999) consisted of abbreviated DBQ measures (Newnam et al., 2002; Wills, Watson & Biggs, 2004) or small sample sizes e.g., <150 (Blockey & Hartley (1995).

What remains evident is that considering the tremendous amount of kilometres driven by professional drivers within Australia each year, often under time pressures, there is a genuine need to examine the usefulness of the DBQ scale to assess driving behaviours, as well as determine the relationship DBQ factors have with the likelihood of crash involvement and traffic offences. As a result, the present research aimed to utilise the DBQ to investigate the self-reported driving behaviours of a group of Australian drivers within a fleet setting. More specifically the study endeavoured to:

- (a) examine the factor structure and generalisability of the DBQ to a sample of professional Australian drivers; and
- (b) investigate the relationship the DBQ has with self-reported crash involvement and traffic offences.

METHOD

Participants

A total of 443 individuals volunteered to participate in the study who were all employees of a large insurance company in Australia. There were 345 (78%) males and 98 (22%) females. The average age of the sample was 44 years (range 18-68yrs). Participants were located throughout Australia in both urban and rural areas. The largest proportion of vehicles driven by participants were reported to be for tool of trade (56%), although vehicles were also salary sacrificed (43%), and a small proportion were leased or participant's own vehicle (1%). Vehicles were reported to be sedans (85%), four wheel drives (12%) or other (3%). The majority of driving by participants was reported to be within the city (46%), or in the city and on country roads (40%). On average participants had held their licence for 26 years (range 5 – 48yrs), had been driving a work vehicle for approximately 5 years (range 1 – 33yrs), with the largest proportion driving between 11 and 20 hours per week (43%), and between 30,000 – 40,000kms per year.

Materials

Driver Behaviour Questionnaire (DBQ)

A modified version of the DBQ was used in the current study that consisted of 20 items. Questions relating to lapses were omitted due to previous research indicating that this factor is not associated with crash involvement (Lawnton et al., 1997; Stradling, Personal Communication, 2003). In addition, the authors of the current paper made minor re-wording or rephrasing modifications, in order to make the questionnaire more representative of Australian driving conditions. For example, references to turning “right” were removed on some items as there are instances where drivers may attempt to overtake someone who is turning left¹. Respondents were required to indicate on a six point scale (0 = never to 5 =

¹ Previous research has demonstrated that the DBQ is robust to minor changes to some items in order to reflect specific cultural and environmental contexts (Blockey & Hartley, 1995; Ozkan & Lajunen, 2005; Parker et al., 2000).

nearly all the time) how often they commit each of the errors (8 items), highway code violations (8 items) aggressive violations (4 items).

Demographic Measures

A number of socio-demographic questions were included in the questionnaire to determine participants' age, gender, driving history (e.g., years experience, number of traffic offences and crashes) and their weekly driving exposure (e.g., type of car driven, driving hours).

Procedure

The vehicle insurance company provided a list of individuals who expressed interest in participating in the research. A letter of introduction, the study questionnaire and a reply paid envelope were distributed through the company's internal mail system to the participants. In total 1440 were mailed out and 443 were returned indicating a 30% response rate.

RESULTS

Factor Structure and Reliability of the Driver Behaviour Questionnaire for an Australian Sample

The internal consistency of the DBQ scale scores were examined through calculating cronbach's alpha reliability coefficients, which are presented in Table 1. Similar to previous Australian research (Blockey & Hartley, 1995; Dobson et al., 1999), and professional drivers (Sullman et al., 2002), the factors appear to exhibit relative internal consistency. Examination of the scores reveals that the items traditionally associated with highway code violations indicate the highest reliability coefficients (.80) while aggressive violations, which consisted of only 4 items, had the lowest reliability (.60).

Insert Table 1.

Table 2 reports the overall mean scores for the three factors, revealing that participants reported a similar frequency for each of the driving categories, although further analyses indicated highway code violations occurred significantly more frequently than errors $F(1, 443) = 80.73, p <.01$ as well as aggressive violations $F(1, 433) = 94.42, p <.01$. The means

are higher than previous research that has focused on college students (Bianchi & Summala, 2004) elderly drivers (Parker et al., 2000), and professional drivers (Sullman et al., 2002; Xie & Parker, 2002), indicating that the current sample engaged in, or at least reported, a higher level of aberrant driving behaviours². In addition, Table 2 reports the mean and standard deviation scores for the three highest ranked items, which were: *Exceed the speed limit on a highway* ($M = 2.62, SD = .94$); *Exceed the speed limit on a residential road* ($M = 2.26, SD = .83$); and *Sound your horn to indicate your annoyance to another driver* ($M = 1.89, SD = .86$). The results indicate that speeding is the most common form of aberrant behaviour reported by the fleet drivers in the current sample, and similar to previous research on professional drivers (Newnam et al., 2004; Sullman et al., 2002), speeding remains one of the major road safety concerns.

Insert Table 2

Factor analysis was administered on the 20 item questionnaire. Principle components analysis with oblique rotation was implemented to determine the factor structure of the DBQ, which revealed a three-factor solution that accounted for 43% of the total variance. The first factor accounted for approximately 29% of the total variance and contained ten items relating to a combination of aggressive driving behaviours and some highway violations. Firstly, the four aggressive items loaded on the factor, with two aggressive items identified as the third and fourth strongest contributors to the factor (e.g., showing anger and sounding one's horn). Secondly, five traditional highway code items also loaded on the factor and one driving error item. However, it is noted that all five highway code items may also be considered to be aggressive acts in some circumstances such as forcing one's way into traffic, driving especially close to another vehicle and overtaking on the inside. Taken together, this factor was labelled aggressive violations due to the predominant focus on hostile aggressive driving behaviours. The second factor accounted for approximately 8% of the total variance and

² However, it is noted that the DBQ questionnaire utilised in the current study most likely varies slightly on the wording of some items compared to previous DBQ research, which should be borne in mind when making comparisons with previous research.

contained 7 items all relating to driving errors, such as failing to check rear vision mirror, failing to notice pedestrians, missing a stop or give way sign and nearly hitting cyclists. As a result this factor was labelled driver errors. The third factor accounted for approximately 6% of the overall variance and comprised of three items with two relating specifically to highway code violations such as speeding on a highway as well as a residential road. As a result, this factor was labelled highway violations, although an additional item relating to drink driving also loaded on this factor³. It is important to note that five items cross-loaded on more than one factor, with two of these items cross-loading to such an extent that they contained similar weightings across factors. All items and factors for the 20-item DBQ are reported in table 3.

Insert Table 3

Inter-correlations between the Variables

The bivariate relationships between participants' self-reported driving exposure, crashes, offences and DBQ factors are presented in Table 4. While the predictive relationship between participants' self-reported driving experiences and the DBQ factors will be examined through regression analyses in the following section, some notable bivariate relationships are reported. In regards to participants' driving exposure, as drivers' age and years licensed increase so do the number of hours and distance travelled. Consistent with previous research (Lajunen et al., 1998; Sullman et al., 2002), age and years driving experience appear to have a significant negative relationship with errors, highway and aggressive violations. This indicates that as drivers gain more experience, they are less likely to engage in aberrant driving behaviours on public roads. However, contrary to previous research (Aberg & Rimmo, 1998; Lajunen et al., 1998; Parker et al., 1995; Sullman et al., 2002) a positive relationship was not identified between the number of kilometres driven each year and the presence of errors and violations. In addition, no significant bivariate relationships were evident between the self-reported number of crashes and participants DBQ scores or driving exposure. However, this may be due to the small number of crashes reported by participants in the previous year as only 48

³ Cronbach's alpha reliability coefficients for the three factors were calculated to be: Aggressive violations (10 items) = .82, Errors (7 items) = .71 & Highway violations (3 items) = .77.

individuals reported being in a crash (11%), with 45 of these drivers reporting only one crash⁴. In contrast, 78 drivers reported incurring fines or demerit points in the past 12 months. As a series of bivariate relationships appear to exist between this event and other driver characteristics, this latter factor will remain the major focus of the following predictive analyses.

Insert Table 4

Prediction of Offences

To further investigate the relationship between self-reported offences and behaviours, a logistic regression analysis was performed to examine the contributions of participants' recent driving exposure (e.g., years, kms driven) and their DBQ scores to whether participants reported incurring fines or demerit points in the past 12 months while at work. While the overall model was significant (Chi square = 20.69, $p = .000$), only the number of kilometres driven proved to be a significant predictor of traffic offences (wald = 11.80, $p = .001$), as not surprisingly, individuals who drive greater distances per year have more opportunities to commit traffic violations. Thus, the element of exposure appears to heavily influence the likelihood of drivers incurring fines/penalties. Additional regression models that controlled for kilometres driven did not identify further significant factors predictive of offences or crashes.

DISCUSSION

The present research aimed to utilise the DBQ to conduct one of the first investigations into the driving behaviours of Australian motorists within a fleet setting. The DBQ has become increasingly popular as a measurement tool to examine motorists' self-reported driving behaviours (Lajunen et al., 2003; Parker et al., 1995). However within the fleet safety setting, scant research has endeavoured to examine the self-reported driving behaviours of those who drive company sponsored vehicles (Newnam et al., 2004; Wills et al., 2004), or investigate the factor structure and predictive ability of the DBQ within this road safety field (Sullman et

⁴ In addition, the result may also result from the relatively short crash time period (e.g., 1 year), as previous research that has reported significant relationships between these factors has focused on longer periods of time (Parker et al., 1995; Sullman et al., 2002).

al., 2002; Xie & Parker, 2002). The utilisation of the DBQ in the current fleet setting presented a number of interesting findings.

Firstly, analysis of the DBQ reliability indicated coefficients that were relatively robust and similar to both the small amount of previous Australian research (Blockey & Hartley, 1995; Dobson et al., 1999) and recent fleet safety findings (Sullman et al., 2002). Encouragingly, despite the subtle alterations to the DBQ to reflect Australian driving conditions, the reliability of the scale appears acceptable. Secondly, examination of the overall mean scores for the original DBQ factors revealed similar scores between the constructs, although highway code violations appear to be exhibited most frequently. This finding is consistent with previous research that has indicated speeding to be the most frequently reported aberrant driving behaviour on public roads (Dimmer & Parker, 1999; Lajunen et al., 2003; Parker et al., 2003). Given the time pressures often placed on professional drivers, it may not be surprising that speeding violations are the most common form of aberrant behaviour both exhibited and reported by fleet drivers. This result may also reflect a general belief that minor speeding violations are acceptable in some circumstances and do not pose a serious road safety risk. Thirdly, older drivers with more experience were less likely to report errors, highway and aggressive violations. While it has traditionally been assumed that more experienced drivers should commit a higher number of slips and lapses (e.g., attention-based errors) (Reason, 1990), participants in the current study with more driving experience were less likely to report aberrant behaviours. However it remains unclear whether this result stems from experienced drivers exhibiting a higher level of driving conduct or simply being less likely to report aberrant driving behaviours. Further research would benefit from examining the relationship between self-reported lapses and official crash and offence data.

In regards to the relationship between the factors, similar to previous research on general motorists (Dobson et al., 1999; Ozkan & Lajunen, 2005), relatively strong correlations were evident between the speeding, aggression and error factors. This finding may suggest that

while the three factors are usually considered distinct, at some level, they reflect related driving behaviours. And as highlighted above, the difference between a highway versus an aggressive violation may yet be proven to be dependent upon the driving purpose and environment. However, it is also recognised that this consistent finding may stem from common method variance and/or social report bias, as individuals who commit one form of driving infringement may also be more likely to report other forms of aberrant driving behaviour. Further research that includes comparisons between general versus professional drivers on the DBQ may prove fruitful in identifying if the relationship between the factors is affected by the purpose of the driving task i.e., personal vs work.

Factor Structure

A series of factor analytic techniques were implemented to assist with the interpretation of the scale scores. Both exploratory and oblique rotations produced five factor models. While some previous studies has reported five factor structures (Parker et al., 2000), the present factors were difficult to interpret, which resulted in a 3 factor solution being sought. This endeavour proved fruitful as 3 factors emerged that generally consisted of errors, highway violations and aggressive violations. The three factor model was relatively consistent with previous research that has found distinctions between the different aberrant driving behaviours (Lajunen et al., 2003; Sullman et al., 2002). Driving errors was the clearest factor to interpret and appeared to be associated with failures of observation and judgement, while general highway violations were characterised by items that were not directed at any one individual, but reflect a deliberate driving act that breaks social norms regarding driving behaviour(s).

In contrast, aggressive violations consisted of a mixture of emotion-oriented responses to driving situations and traditional highway code violations. However, it is noted that the four highway violations that loaded on this factor may be interpreted as aggressive violations, especially for experienced professional drivers. For example, driving especially close to a car

in front of you to indicate for them to drive faster and crossing a junction knowing that the lights have already turned against you may constitute an aggressive behaviour or at least indicate some level of frustration. Thus, behaviours traditionally viewed as highway violations may be classified as aggressive and aberrant, or at least, may originate from emotions associated with frustration. More specifically, earlier distinctions identified between highway code violations (i.e., gaining advantage) and interpersonal violations (i.e., deliberate & aggressive) (Lawnton et al., 1997) may prove less clear with professional drivers. Furthermore, speeding-related behaviours during personal driving time for general motorists may yet be proven to be associated with intrinsic needs (i.e., sensation seeking and time management) while speeding for work purposes may be the product of time and work pressure that result in aggressive violations. When considering that the vehicle may be increasingly becoming an extension of the office (i.e., taking phone calls, eating), the process of multitasking and time pressures may direct impact on driving behaviours.

When considered with Shinar's (1998) frustration-aggression model, some of the above mentioned behaviours may originate from a frustrated driver who infringes upon another road user's rights in order to move forward (i.e., instrumental aggression) while other behaviours may constitute hostile aggressive acts where the driver directs his/her frustration at another (i.e., hostile aggression). From this perspective, both types of behaviours can be identified within the aggressive violations factor identified in the current study, and thus Shinar's (1998) model may prove useful when attempting to develop a systems approach to this problem through the development of countermeasures that impact upon the driver as well as the driving environment.

In summary, given that fleet drivers spend considerably longer periods of time on the road than the general driving population, this group may be prone to experience and/or exhibit a wider range of aggressive acts, and thus a greater number of items may be required to examine this factor. The corresponding calculation of cronbach's alpha reliability coefficients for the new factors (e.g., the number of items assigned to the aggressive violations factor was

increased from four to ten) revealed higher reliability scores than for the traditional item loading structure calculated before the factor analytic technique⁵.

However, the item-loading characteristics of the current study may be influenced by a number of additional issues. Firstly, the demographics of the current group may be different to previous samples that have reported clear, distinctive factors. Secondly, the lack of research into fleet drivers combined with the difficulties interpreting the factor structure may indicate that individuals who drive for work, especially fleet drivers, are a special population who may experience and exhibit different driving behaviours to the general motoring population. Given that the factor structure of the DBQ has varied considerably (e.g., 3 to 6 factors) in different countries and different settings, situational and cultural factors need to be taken into account when utilising the DBQ (Lajunen et al., 2003).

Prediction of Offences

In regards to the prediction of self-reported driving offences and crashes, while a number of bivariate relationships were evident between the variables, few proved significant at a multivariate level. Only a small proportion of the sample reported being in a crash within the last year, which contributed to difficulties identifying factors associated with the event. While the time period to examine the incidence of crashes in the current study may have been relatively short (e.g., one year), accidents remain a relatively rare event and the current findings support previous research that suggests an aggregate of different driving behaviours/offences may be required to obtain an accurate measure of driving performance (Ulleberg & Rundmo, 2003). Subsequently, an examination of self-reported driving violations revealed a larger proportion of the fleet drivers reported incurring fines and demerit points (compared to crashes), with errors, highway violations and aggressive violations all appearing associated with traffic offences. However, at the multivariate level only the number of kilometres driven per year proved to be a significant predictor of such offences,

⁵ Although this is to be expected as cronbach's alpha usually increases with the inclusion of additional items.

which suggests that the element of “exposure” to the driving environment is a powerful influence on driving outcomes. While researchers have suggested that individuals who spend longer periods on the road are at a greater risk of crash involvement (Sullman et al., 2002), the current study has indicated that spending longer periods on the road is also associated with a greater risk of incurring fines/demerit points.

In practical terms, the above findings and further research into fleet drivers has the potential to assist in the development of targeted interventions and strategies aimed at addressing factors contributing to crashes. Currently, fleet databases predominantly consist of crash statistics and associated data that are collected after the event, with little data gathered that may indicate what driving behaviours contributed to the crash. Utilising the DBQ and other measurements provides a proactive organisational perspective of the type of behaviours exhibited by drivers as well as providing the potential to identify the types of behaviours associated with offences and crashes. Importantly, the use of such measures assist in the development of targeted interventions aimed at reducing the likelihood of a crash before the event occurs, rather than on the traditional post hoc basis.

Limitations

A number of limitations should be taken into account when interpreting the results of this study. The response rate of participants was relatively low, but consistent with previous research utilising the DBQ scale in Australia (Dobson et al., 1999). Similar to research in this area, concerns remain regarding the reliability of the self-reported behaviour, such as the propensity of professional drivers to provide social desirable responses. Questions also remain about the representativeness of the sample as participants were mainly corporate fleet drivers (e.g., involved in insurance sales) and such driving styles may not be easily transferable to other fleet driving populations. In summary, further research is required to establish the reliability and validity of the scale for the Australian setting. Future research could also benefit from determining whether minor changes to items are required to reflect the Australian driving conditions or whether the traditional DBQ is robust to cultural and environmental variations. Finally, additional investigation into contemporary driving issues

such as mobile phone use may assist in the identification of further factors that affect current motoring safety levels.

Conclusion

Taken together, the results of the present research indicate that the DBQ scale can successfully be utilised to examine self-reported aberrant driving behaviours within a fleet setting in Australia. However, consistent with previous research (Lajunen et al., 2003), the number of factors as well as the specific factor structure of the scale appears to change with different driving populations. Within a fleet setting, it appears that a greater number of items (e.g., driving behaviours) may in fact reflect aggressive driving acts rather than speeding behaviours traditionally defined in the original DBQ. Although, it is noted that a temporality issue may also be evident as aggressive violations in any current context may result in speeding violations (e.g., highway violations) within a matter of moments. Further research is required to clarify some of the issues identified in the present findings. Firstly, additional research is needed to determine whether fleet drivers exhibit a wider range of aggressive violations than the general driving population. Secondly, while the current study suggests minor modifications can be made to individual items to more accurately reflect Australian driving conditions, further research is required to determine what impact such modifications have on the factor structure of the scale. Finally, further examination of the factors associated with aberrant driving behaviours in both professional and general driving settings can only complement the development of countermeasures that effectively increase road safety.

Table 1. *Alpha reliability coefficients of the DBQ scale*

	Current Sample	Sullman et al. (2002)
Errors (8 items)	.77	.71
Highway Code Violations (8 items)	.80	.62
Aggressive Violations (4 items)	.60	.57

Table 2. *Mean Scores for the DBQ factors*

	Sample	
	<i>M</i>	<i>SD</i>
Errors (8 items)	1.61	.37
Highway Code Violations (8 items)	1.70	.58
Aggressive Violations (4 items)	1.53	.48
Highest Ranked Items		
1. Exceed the speed limit on a highway	2.62	.93
2. Exceed the speed limit on a residential road	2.26	.83
3. Sound your horn to indicate annoyance	1.89	.86

Table 3. *Factor structure of the modified DBQ*

Description	F1	F2	F3
Race away from traffic lights to beat car beside you	.73		
Become impatient by slow driver and overtake on inside	.70		
Become angered by another driver and show anger	.69		
Sound your horn to indicate your annoyance at another driver	.68		
Drive especially close to the car in front to signal drive faster	.67		
Stay in a closing lane and force your way into another	.53		
Cross junction knowing traffic lights have already turned	.44		
Skid while breaking or cornering on a slippery road	.40	.34	
Become angered by another driver and give chase	.36		
Pull out of a junction and so far that your disrupt traffic	.35	.36	
Fail to check rear view mirror when changing lanes		.67	
Fail to notice pedestrians are crossing in your path of traffic		.66	
Miss stop or give way signs		.63	
When overtaking underestimate speed of oncoming vehicle		.63	
Nearly hit a cyclist while turning		.54	
Nearly hit another car while queuing to enter a main road		.47	
Attempt to overtake someone you hadn't noticed turning		.46	-.32
Exceed the speed limit on a residential	.44		.60
Exceed the speed limit on highway	.47		.60

Drive even though you suspect you are over legal limit				.51
Amount of variance explained	28.8	8.3	6.3	

Table 4. *Pearson correlations between the major driving variables*

	1	2	3	4	5	6	7	8	9
1. Age	--	.97**	.10*	.09*	-.10*	-.21**	-.18**	-.05	-.05
2. Years licensed		--	.11*	.10*	-.11*	-.20**	-.19**	-.07	-.04
3. Hours driving per week			--	.56**	.03	.01	-.01	.08	.06
4. Kilometres per year				--	-.01	.01	-.07	.06	.15**
5. Errors					--	.62**	.53**	.04	.13**
6. Highway violations						--	.62**	-.04	.10
7. Aggressive violations							--	-.04	.10
8. Crashes past 12 months								--	.22**
9. Offences last 12 months ¹									--

Note: ¹ = fines or demerit points in the past 12 months, * = $p < .05$, ** $p < .01$.

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