

Parent and adolescent risky driving behaviours: New Zealand Drivers Study

Rebecca Brookland¹, Dorothy Begg¹, John Langley¹, Shanthi Ameratunga²

¹Injury Prevention Research Unit, University of Otago;

²School of Population Health, University of Auckland.

Abstract

Young drivers are over represented in motor vehicle crash statistics. As a measure to reduce young driver crashes many high-income countries operate graduated driver licensing systems, which are designed to limit new drivers' exposure to high risk driving situations. Graduated licensing provides an important opportunity for parents to take an active role in the "learning to drive" process, often as the supervisor or driving coach. Research has shown that driving behaviours of parents can influence the driving behaviours of their children. The aim of the present study was to describe and compare the risky and dangerous driving behaviours of parents and their newly licensed adolescents. The role of parent and adolescent gender in this relationship was also examined. This study was part of a longitudinal study of 3992 newly licensed drivers, the New Zealand Drivers Study (NZDS). At the restricted licence stage 894 young drivers and their parent (who supervised their driving at the learner licence stage) independently reported their risky and dangerous driving behaviours by completing the Manchester Driving Behaviour Questionnaire. Parents and adolescents reported low levels of driving violations and errors overall. A significant, but weak association between parent and adolescent risky driving behaviours was evident.

Keywords

Young drivers, Parental influence, Risky driving

Introduction

Despite the gains made by the implementation of graduated driver licensing systems (GDLS) [1] young drivers are still over-represented in the motor vehicle crash statistics of many high-income countries [2]. In New Zealand motor vehicle crashes are the leading cause of injury mortality and a leading cause of injury morbidity for 15-24 year olds. In 2006, the motor vehicle crash rate for 15-24 year olds was 16.9/100,000 population, compared with 9.4/100,000 for the population as a whole [2].

The first comprehensive GDLS was introduced in New Zealand in 1987 [3], and today many western jurisdictions operate graduated licensing programmes [1]. GDLS are designed to limit new drivers' exposure to high risk driving situations, such as night-time driving, carrying young passengers and driving after drinking alcohol, with gradual decreases in driving restrictions as drivers advance through the stages of the licensing system.

Although parents¹ have always had a vested interest in their children's early driving experiences and safety, the implementation of GDLS has reinforced the role of parents in this process. This increased parental involvement, via GDLS, can be explicit, as in California where parents need to certify that 50 hours of supervised driving has occurred [4], or implicit as it is in New Zealand. When GDLS was introduced in New Zealand there was an expectation that parents would take an active role by enforcing the restrictions [5], and more recently there have been moves towards encouraging greater parental involvement, through young driver programmes [6]. This increasing role for parents has led to a growing body of international work focused on examining how parental practices shape adolescents driving experiences. Research has shown that parents manage the driving experiences of their children by influencing the age of licensure, placing restrictions on vehicle access and enforcing GDLS conditions [7-14]. Research has also shown that parental attitudes may influence the driving outcomes for young drivers. Hartos and colleagues found fewer parental driving restrictions in the first months of licensure, predicted higher levels of risky driving behaviours one year later [11].

¹ The term 'parent' will be used throughout this paper and includes parent, caregiver or guardian.

These studies [7-14] have looked at parental influence, as perceived by their child, and have focussed on parental attitudinal and monitoring measures. There has been little work that has directly examined the influence of parents own driving behaviours on their children's driving behaviours and outcomes. Of the published work in this field two studies, one conducted in North Carolina [15] and the other in British Columbia [16] have utilised official crash reports for parents and their children to determine the association between their respective crash and conviction records. Ferguson and colleagues examined North Carolina driving records and found a significant positive association between parent and adolescent driving records in the preceding five year period. Specifically, young drivers whose parents had committed driving violations were more likely to also have committed driving violations, and young drivers whose parents had crashed were more likely to also have had a crash [15]. In British Columbia Wilson and colleagues focused on at-fault crashes, as defined by insurance liability, and found adolescent crash risk in the first three years of full licensure was predicted by parent crash records during the four years prior to adolescent licensure. Specifically, for each of the parents at-fault crashes the adolescents crash risk increased by 13% [16].

Two other studies, one with 174 Israeli families [17] and the other with 123 Brazilian families [18] interviewed parents and their children to determine the association between their self-reported driving behaviours. Taubman - Ben-Ari and colleagues used the multidimensional driving style inventory (MDSI) to examine the correlation between the driving styles of parents and their adult children, aged 18 to 33 years. They found both mothers and fathers' anxious, reckless, and careful driving styles significantly correlated to these driving styles in their adult children [17]. Using the 28 item driver behaviour questionnaire (DBQ-28) Bianchi and Summala investigated the association between the risky driving behaviours of parents and their adult children, aged 18 -30 years who had held driver licences for four years on average. They found parent errors, ordinary violations, aggressive violations and lapses significantly correlated with the respective driving behaviour in their child. After controlling for driving exposure and background factors parents driving errors predicted their children's driving errors; and parent's ordinary violations predicted their children's ordinary violations. However parent's aggressive violations or lapses no longer explained these respective behaviours in their children [18].

In New Zealand the minimum age at which an adolescent can obtain a learner licence is 15 years and all their driving during this stage is required to be supervised. The learner licence must be held for a minimum of six months, at which time drivers can take the test for their restricted licence, which allows them to drive unsupervised, except at night (10pm-5am), or when carrying passengers. Therefore potentially in New Zealand 15½ year olds can drive unsupervised. This is of particular concern given that the first six months of unsupervised driving carry the greatest crash risk for novice drivers, and this increased risk is more pronounced in the youngest novice drivers [19]. Collectively the four studies outlined previously indicate that a relationship exists between parents' driving behaviours and the driving behaviours of their children [15-18]. However these studies have all examined the influence of parents driving behaviours when their child had had several years of driving experience. In contrast, this paper examines the influence of parents driving behaviours on young novice drivers. If driving behaviours are transferred from parent to child it is possible that young drivers may enter the most dangerous stage of being a novice driver - driving unsupervised - modelling their parents risky driving behaviours, and consequently increasing their risk of being involved in a motor vehicle crash.

The aim of the present study was to:

- describe the risky driving behaviours of young drivers during their learner licence stage,
- describe the risky driving behaviours of their parent, and
- examine to what extent the driving behaviours of adolescents reflect their parents driving behaviours at this early stage of licensure.

Method

This research was part of a longitudinal study, the New Zealand Drivers Study (NZDS), which is following a cohort of 3992 newly licensed car drivers. The NZDS cohort was recruited between 1st February 2006 and 31st January, 2008 from driver licensing agencies and licensing courses throughout New Zealand, when potential participants passed their car learner licence theory test (Class 1L Licence). At this stage participants completed a self-administered baseline questionnaire. The follow-up telephone interviews are aligned with the licensing stages of the GDLS, with the first taking place at the restricted licence stage (Class 1R licence) and the second (follow-up telephone interview taking place) at the full licence stage (Class 1F licence). After full licensure, ongoing follow-up

will continue through national databases that monitor motor vehicle related crashes, infringements, convictions and hospitalisations.

This research relates to NZDS young drivers, aged 15 - 17 years at the learner licence stage, who had completed their first follow-up interview (restricted licence stage) prior to 1st May 2008, and interviews with their parent who had supervised their driving during the learner licence stage.

Data Collection

After cohort members had passed their restricted licence test they were contacted to complete their first follow-up telephone interview. This was a computer assisted telephone interview that collected information on: driving experience during learner licence stage, attitudes and knowledge regarding GDLS, general alcohol and drug use, intentions for restricted licence stage, traffic infringements and crashes, as well as the driving behaviour measure reported in this paper (described later). Contact details for parents were obtained from all eligible young drivers when they had completed their restricted licence interview. Initial contact with parents was made by a personal letter to the parent informing them about the study, and inviting their participation. This letter was followed by a computer assisted telephone interview for those parents who agreed to participate. In situations where two parents were available to be interviewed the parent whom the young driver deemed their main supervisor was the first preference. If this parent refused then the second parent was invited to take part. The parent interview gathered the following measures: parent demographics, knowledge and attitudes towards the licensing system and road safety, experience with learner licence stage, expectations for restricted licence stage, their traffic infringements and crashes, and the driving behaviour questionnaire. To help ensure confidentiality for both the parents and the young drivers, their respective interviews were conducted by different trained interviewers.

Participants

In total 1060 young drivers had completed their restricted licence stage follow-up interview by 1st May, 2008. Of these, 919 parents (87%) completed the parent interview. As this paper examined the relationship between parent and adolescent driving behaviours, parents who had not been a supervisor during the learner licence stage were excluded from the analyses. This left 894 parent-adolescent pairings. A further 18 cases were excluded due to missing responses for the driving behaviour measure, leaving 876 young drivers (58% male) and their parent (64% mothers) for analyses. For the young drivers, the mean age at restricted licensure was 16.3 years (s.d. = 0.77) for males, and 16.4 years (s.d. = 0.83) for females, and mean length of time on the learner licence was 9 months (s.d. = 3.07) for males and 10 months (s.d. = 3.70) for females. For parents, fathers mean age was 49.2 years (s.d. = 6.25) and average length of full licensure was 31.7 years (s.d. = 7.74). For mothers, mean age was 46.2 years (s.d. = 4.92) and average length of full licensure 27.3 years (s.d. = 7.20). In total there were 202 father-son pairings, 302 mother-son pairings, 115 father-daughter pairings and 257 mother-daughter pairings, giving 876 pairs altogether.

Risky Driving Behaviour Measure

The Manchester Driving Behaviour Questionnaire (DBQ short form) [20] was used to measure parent and adolescent risky driving behaviours. The DBQ measures driving errors, violations and lapses. The eight lapse questions were not asked as prior research has shown that the lapse subscale has a poor predictive relationship with negative driving outcomes [21], such as crash involvement, which is a main objective of the NZDS. For this study the eight items measuring errors and the eight violation items were included to measure the level of risky driving behaviours engaged in (Table 1 lists the questions in each subscale). For each DBQ question participants had to indicate how often they engaged in the behaviour while driving, using a six point likert scale (range 0-5). Possible response options were 'never', 'hardly ever', 'occasionally' 'quite often' 'frequently' and 'nearly all the time'. After examination of the frequency distributions for each question it was decided to dichotomise the responses for the descriptive analysis. 'Never' responses were coded as '*never done*' any risky driving behaviour and the remaining response options were coded as '*ever done*' any risky driving behaviour. To determine the relationship between the parent and young driver risky driving behaviours the mean score for each subscale was calculated, creating a mean error score and a mean violation score.

Statistical Analysis

Chi Square analyses were used to determine the statistical significance of difference in the frequency of each of the 16 risky driving behaviours, for young drivers by gender, and for parents by gender. To examine the internal consistency of each DBQ subscale score Cronbach's alpha coefficients were calculated. Spearman's rank correlation coefficients (ρ) were calculated to assess the relationship between the risky driving behaviours of parents

and their adolescent. Spearman's rank correlation was used as the data was positively skewed and Spearman's is a non parametric measure of association that does not require the assumptions of normality to be met [22].

Results

Young driver risky driving behaviours

Table 1 reports the descriptive statistics for each DBQ item for sons and daughters and shows the gender differences in their risky driving behaviours. The most frequently reported **errors** by young drivers were 'fail to check in rear view mirror before pulling out' with 55% of sons and 48% of daughters reporting ever doing this ($\chi^2 = 4.92$ $p=0.027$) and 'underestimate speed of oncoming vehicle when overtaking' (sons 35%, daughters 27%, $\chi^2 = 7.18$ $p=0.007$).

The most frequently reported **violations** by young drivers were 'drive faster than the speed limits late at night or early in the morning' (sons 56%, daughters 52% reported ever doing this), 'cross an intersection knowing lights already turned against you' (sons 34%, daughters 27%, $\chi^2 = 4.86$ $p=0.028$) and 'driving especially close to car in front to signal to the driver to move or go faster' (sons 35%, daughters 22%, $\chi^2 = 16.34$ $p<0.001$). Significantly more sons than daughters reported committing the following driving violations; 'on a single lane road, become impatient and overtake on the inside' ($\chi^2 = 7.72$ $p=0.006$), 'show your anger to other people on road' ($\chi^2 = 21.07$ $p<0.001$) and 'get involved in unofficial street races' ($\chi^2 = 11.41$ $p<0.001$).

Parent risky driving behaviours

Table 2 reports the descriptive statistics for each DBQ item for fathers and mothers and shows the gender differences in their risky driving behaviours. The most frequently reported **errors** by parents were 'underestimate speed of oncoming vehicle when overtaking' with 36% of fathers and 26% of mothers reporting ever doing this ($\chi^2 = 9.17$ $p=0.003$) and 'when queuing to turn left, nearly hit car in front' (fathers 30%, mothers 23%, $\chi^2 = 5.05$ $p=0.025$). Significantly more mothers than fathers reported that they 'brake too quickly on a slippery road, or steer wrong way into a skid' ($\chi^2 = 10.34$ $p=0.001$).

The most frequently reported **violations** by parents were 'drive faster than the speed limits late at night or early in the morning' (fathers 71%, mothers 62% reported ever doing this, $\chi^2 = 7.08$ $p=0.008$), 'cross an intersection knowing lights already turned against you' (fathers 50%, mothers 50%) and 'show anger to other people on road' (fathers 46%, mothers 38%, $\chi^2 = 6.23$ $p=0.013$). Significantly more fathers than mothers reported committing the following driving violations; 'drive especially close to car in front' ($\chi^2 = 20.83$ $p<0.001$), 'get angered by another drivers behaviour and give chase' ($\chi^2 = 13.14$ $p<0.001$), 'drive even though blood alcohol over legal limit' ($\chi^2 = 25.19$ $p<0.001$), and 'get involved in unofficial street races' ($\chi^2 = 9.93$ $p=0.002$).

Table 1. Distribution of responses to DBQ item for sons and daughters and χ^2 test for gender differences.

		Sons (N=504)		Daughters (N=372)		ChiSq	p-value
		never done	ever done	never done	ever done		
ERRORS <i>How often do you...</i>							
attempt to overtake someone who you hadn't noticed to be signalling a right turn?	n	419	85	325	47	2.99	0.084
	%	(83.1)	(16.9)	(87.4)	(12.6)		
fail to notice that pedestrians are crossing when turning into a side street from a main road?	n	351	153	261	111	0.03	0.869
	%	(69.6)	(30.4)	(70.2)	(29.8)		
when turning left, nearly hit cyclists who come up on your inside?	n	467	37	342	30	0.16	0.691
	%	(92.7)	(7.3)	(91.9)	(8.1)		
when queuing to turn left onto a main road, pay such close attention to the main stream of traffic that you nearly hit the car in front?	n	400	104	301	71	0.32	0.571
	%	(79.4)	(20.6)	(80.9)	(19.1)		
underestimate the speed of an oncoming vehicle when overtaking?	n	327	177	273	99	7.18	0.007
	%	(64.9)	(35.1)	(73.4)	(26.6)		
miss 'Give Way' signs and narrowly avoid colliding with traffic having the right of way?	n	412	92	284	88	3.83	0.051
	%	(81.7)	(18.3)	(76.3)	(23.7)		
fail to check your rear view mirror before pulling out, changing lanes etc?	n	226	278	195	177	4.92	0.027
	%	(44.8)	(55.2)	(52.4)	(47.6)		
brake too quickly on a slippery road, or steer the wrong way into a skid?	n	420	84	309	63	0.01	0.916
	%	(83.3)	(16.7)	(83.1)	(16.9)		
VIOLATIONS <i>How often do you...</i>							
On a single lane road, become impatient with a slower driver and overtake on the left?	n	403	101	324	48	7.72	0.006
	%	(80.0)	(20.0)	(87.1)	(12.9)		
drive especially close to the car in front as a signal to its driver to go faster or get out of the way?	n	328	176	289	83	16.34	<0.001
	%	(65.1)	(34.9)	(77.7)	(22.3)		
cross an intersection knowing that the traffic lights had already turned against you?	n	332	172	271	101	4.86	0.028
	%	(65.9)	(34.1)	(72.8)	(27.2)		
get angered by another driver's behaviour and give chase with the intention of giving him/her a piece of your mind?	n	452	52	344	28	2.01	0.156
	%	(89.7)	(10.3)	(92.5)	(7.5)		
drive faster than the speed limits late at night or early in the morning?	n	223	281	180	192	1.48	0.224
	%	(44.2)	(55.8)	(48.4)	(51.6)		
drive even though you realise that you may be over the legal blood alcohol limit?	n	468	36	356	16	3.10	0.079
	%	(92.9)	(7.1)	(95.7)	(4.3)		
show your anger to other people you dislike on the road?	n	357	147	313	59	21.07	<0.001
	%	(70.8)	(29.2)	(84.1)	(15.9)		
get involved in unofficial 'street races' with other drivers?	n	449	55	355	17	11.41	<0.001
	%	(89.1)	(10.9)	(95.4)	(4.6)		

Table 2. Distribution of responses to DBQ item for fathers and mothers and χ^2 test for gender differences.

<i>ERRORS</i> How often do you...		Fathers (N=317)		Mothers (N=559)		ChiSq	p-value
		never done	ever done	never done	ever done		
attempt to overtake someone who you hadn't noticed to be signalling a right turn?	n	281	36	507	52	0.94	0.331
	%	(88.6)	(11.4)	(90.7)	(9.3)		
fail to notice that pedestrians are crossing when turning into a side street from a main road?	n	243	74	425	134	0.04	0.834
	%	(76.7)	(23.3)	(76.0)	(24.0)		
when turning left, nearly hit cyclists who come up on your inside?	n	279	38	492	67	0.00	0.999
	%	(88.0)	(12.0)	(88.0)	(12.0)		
when queuing to turn left onto a main road, pay such close attention to the main stream of traffic that you nearly hit the car in front?	n	222	95	430	129	5.05	0.025
	%	(70.0)	(30.0)	(76.9)	(23.1)		
underestimate the speed of an oncoming vehicle when overtaking?	n	204	113	414	145	9.17	0.003
	%	(64.4)	(35.6)	(74.1)	(25.9)		
miss 'Give Way' signs and narrowly avoid colliding with traffic having the right of way?	n	265	52	463	96	0.09	0.770
	%	(83.6)	(16.4)	(82.8)	(17.2)		
fail to check your rear view mirror before pulling out, changing lanes etc?	n	232	85	436	123	2.59	0.108
	%	(73.2)	(26.8)	(78.0)	(22.0)		
brake too quickly on a slippery road, or steer the wrong way into a skid?	n	279	38	444	115	10.34	0.001
	%	(88.0)	(12.0)	(79.4)	(20.6)		
<i>VIOLATIONS</i> How often do you...							
On a single lane road, become impatient with a slower driver and overtake on the left?	n	276	41	468	91	1.77	0.184
	%	(87.1)	(12.9)	(83.7)	(16.3)		
drive especially close to the car in front as a signal to its driver to go faster or get out of the way?	n	200	117	433	126	20.83	<0.001
	%	(63.1)	(36.9)	(77.5)	(22.5)		
cross an intersection knowing that the traffic lights had already turned against you?	n	158	159	280	279	0.00	0.943
	%	(49.8)	(50.2)	(50.1)	(49.9)		
get angered by another driver's behaviour and give chase with the intention of giving him/her a piece of your mind?	n	286	31	538	21	13.14	<0.001
	%	(90.2)	(9.8)	(96.2)	(3.8)		
drive faster than the speed limits late at night or early in the morning?	n	92	225	212	347	7.08	0.008
	%	(29.0)	(71.0)	(37.9)	(62.1)		
drive even though you realise that you may be over the legal blood alcohol limit?	n	238	79	493	66	25.19	<0.001
	%	(75.1)	(24.9)	(88.2)	(11.8)		
show your anger to other people you dislike on the road?	n	170	147	348	211	6.23	0.013
	%	(53.6)	(46.4)	(62.3)	(37.7)		
get involved in unofficial 'street races' with other drivers?	n	301	16	551	8	9.93	0.002
	%	(95.0)	(5.0)	(98.6)	(1.4)		

Table 3. DBQ error and violation subscale mean scores and standard deviations for each group and correlations between parent - young driver pairings.

		Mean Score				Spearman Rho (ρ) Rank Order Correlations ^a					
		Son	Daughter	Father	Mother	All pairings	Father-Son	Mother-Son	Father - Daughter	Mother-Daughter	
<i>DBQ Factors^b</i>	N	504	372	317	559	876	202	302	115	257	
	Errors										
	Mean	0.35	0.31	0.26	0.24	ρ	0.08	0.07	0.16	0.11	-0.03
	s.d	(0.31)	(0.34)	(0.27)	(0.29)	<i>p</i> -value	(0.019)	(0.304)	(0.004)	(0.258)	(0.605)
	Violations										
	Mean	0.40	0.28	0.54	0.41	ρ	0.10	0.01	0.08	0.11	0.16
	s.d	(0.43)	(0.33)	(0.37)	(0.32)	<i>p</i> -value	(0.004)	(0.839)	(0.165)	(0.232)	(0.013)

^a ρ =Spearman rho (ρ) correlation coefficient

^b range from 0 (never) to 5 (nearly all the time)

Comparison of young driver and parent risky driving behaviours

Table 3 reports the mean scores and standard deviations for the DBQ errors and violations subscale for each group. Mean error scores were similar between the groups with sons reporting the most errors. For violations, fathers had the highest mean violation score, while daughters reported the lowest. To examine the internal consistency of the error and violation subscales Cronbach's alpha coefficients were calculated. For the error subscale, the alpha coefficients were $\alpha=0.59$ for young drivers and $\alpha=0.68$ for parents. For the violation subscale, the alpha coefficients were $\alpha=0.70$ for young drivers and $\alpha=0.53$ for parents. Reliability analyses indicated that removing any item from either subscale would decrease their internal consistency.

Correlations between the parent and young driver pairings showed that overall parent and young driver errors were significantly correlated ($\rho=0.08$, $p=0.019$) and parent and young driver violations were significantly correlated ($\rho=0.10$, $p=0.004$). Further investigation of these associations by gender pairings showed that the only associations that were statistically significant ($p<0.05$) were mother and son driving error behaviours ($\rho=0.16$, $p=0.004$) and mother-daughter driving violations ($\rho=0.16$, $p=0.013$). Although these correlation are significant the strength of the associations are very low, as shown in table 3.

Discussion

The current study utilised the DBQ to examine adolescent's risky driving behaviour during the early stage of licensure, their parent's risky driving behaviour and the extent of the relationship between them.

As indicated by the mean score for each subscale both young drivers and parents reported low levels of driving related errors and violations overall, with the frequency of committing the risky driving behaviours between never and hardly ever. This finding is consistent with the level of risky driving reported in previous studies using the DBQ [20, 23, 24]. In regards to errors, young drivers tended to commit more errors than their parents. For the specific error behaviours there were some gender differences. For example fathers (compared to mothers) and sons (compared to daughters) were more likely to report underestimating the speed of oncoming vehicles when overtaking.

Violations were more commonly reported by males than their comparative female group. For example fathers reported more violations than mothers, and had the highest mean violation score overall; sons reported the same level of violations as mothers but had greater violations than daughters (who reported the lowest level of violations). Examination of the individual violation items highlighted a number of significant gender differences. For young drivers, sons were more likely than daughters to commit violations. Even at this early stage of licensure sons were reporting a greater propensity to engage in aggressive and dangerous driving acts. One third of sons reported

driving especially close to other cars to get the other driver to go faster or move; 30% had shown their anger to other road users; one in five had (on a single lane road) become impatient with a slower driver and overtaken on the inside, and 11% had got involved in 'street racing'. Fathers were significantly more likely than mothers to engage in six out of the eight violation behaviours, which involved speeding, drink driving, and acting aggressively towards other drivers. These gender differences, with males reporting more violations than their comparative female group, are in line with findings of other studies which have used the DBQ [21, 23, 25].

Correlation analysis to examine the extent to which the driving behaviours of adolescents reflect their parents driving behaviours showed significant but weak associations between parent and adolescent errors and also between parent and adolescent violations. The more driving errors parents reported, the more errors reported by their child, similarly the more violations parents reported, the more violations their child reported. However examination of these associations by gender showed that only mothers driving behaviours were associated with their adolescent's, and a different pattern was apparent for errors versus violations. There was an association between mother and son errors, and an association between mother and daughter violations. No relationship was shown to exist between father and adolescent driving behaviours. These findings add to the inconsistencies in the field with regards to the role of gender in the association between parent and child driving behaviours. Taubman - Ben-Ari and colleagues found stronger parent-child associations within gender, rather than across gender; father-son and mother-daughter driving styles were the most similar [17], whereas Bianchi and Summala found adding parent gender to their model as a predictor did not alter the relationship between parent and child driving behaviours [18]. Overall the findings of the current study provide weak support for the previous work in this area which indicated a relationship between parent and children's driving behaviours [17, 18]. Given the increase in parental involvement in the "learning to drive" process under GDLS, and the young age of licensure in New Zealand, the current study focused on to what extent the driving behaviours of adolescents reflect their parents driving behaviours at an early stage of licensure; when young drivers were novice and had to drive supervised. It is possible that the influence of parental driving behaviour becomes more evident as their child's driving experience increases.

There are some limitations with the current study which must be considered. Firstly, an alpha coefficient of 0.70 or above is normally used as the cut-off value for acceptability of a summative scales internal consistency [26]. Some of the alpha coefficients in this study had only low to moderate levels of internal consistency, for example young drivers error $\alpha=0.59$ and parents violations $\alpha=0.53$. It may be that the DBQ error and violation subscale structures, as they stand, may not fit the New Zealand situation as well as they might and further investigation of the factor structure of the DBQ is needed.

Secondly, the DBQ is a measure of risky driving that uses a frequency response scale; therefore people who drive more often have increased opportunity to commit risky driving behaviours and subsequently may report higher levels of errors and violations, compared with people who drive less frequently. There was no attempt in this study to account for the impact of driving exposure on risky driving behaviour.

Thirdly, the DBQ is a self-report measure and as such is open to social desirability bias. This may be even more of an issue in the present study as the DBQ was administered over the telephone, rather than the traditional pen and paper method. Although parent and young driver interviews were conducted by separate teams of interviewers and confidentiality was assured, participants in this study had reduced levels of anonymity, and therefore they may have given responses that presented themselves in a more favourable manner. The effect of this would be an under-reporting of the error and violation behaviours, although this would apply to parents and children.

In conclusion although young drivers and parents had low levels of risky driving overall, examination of responses to individual items suggests the types of behaviours engaged in should cause concern, given the tendency of these behaviours to be major contributing factors in fatal and injury crashes: specifically speed, alcohol, failing to give way or stop [27]. In this study half of all young drivers and 60-70% of parents reported speeding early in the morning, or late at night; one third of young drivers and half of all parents reported crossing intersections against the lights; 25% of fathers and 12% of mothers had driven even when they thought they were over the legal alcohol limit. This study provided weak support for a relationship between parent and adolescent driving behaviours.

As the NZDS is ongoing and the recruitment of parents and young drivers continues, this is a work in progress. Therefore the findings presented here should be considered provisional. Once parent recruitment is complete a more

comprehensive analysis of parent and adolescent risky driving behaviours, which takes the factor structure of the DBQ measure into consideration and includes a driving exposure measure, will be undertaken.

Acknowledgments

The New Zealand Drivers Study is funded by the Health Research Council of New Zealand, the Accident Compensation Corporation and the Road Safety Trust. The support of the NZ Automobile Association during recruitment, and ongoing support of the NZ Driver Licence Registry is acknowledged. The authors wish to thank Associate Professor Peter Herbison for his statistical advice on this paper, Anna McDowell for her continued assistance with the NZDS and the many research assistants involved with the study.

References

1. Hartling L, Wiebe N, Russell K, Petruk J, Spinola C, Klassen TP. Graduated driver licensing for reducing motor vehicle crashes among young drivers (Cochrane Review). In: *The Cochrane Library*, Issue 3. Chichester, UK: John Wiley & Sons, Ltd.; 2004.
2. International Road Traffic Accident Database. (2008). *Selected risk values for the year 2006*. Retrieved June, 2008, from <http://www.cemt.org/irtad/IRTADPUBLIC/we2.html>.
3. Begg D, Stephenson S. Graduated driver licensing: the New Zealand experience. *Journal of Safety Research* 2003;34(1):99-105.
4. Masten SV, Hagge RA. Evaluation of California's graduated driver licensing program. *Journal of Safety Research* 2004;35(5):523-535.
5. Ministry of Transport. The graduated driver licensing system. In. Wellington: Office of the Ministry of Transport.; 1987.
6. Cummins M. Novice driver activity. In: AA Driver Education Conference; 2003 April 30 - May 01; Wellington; 2003.
7. Mayhew DR, Simpson HM, Ferguson SA, Williams AF. Graduated licensing in Ontario: a survey of parents. *Journal of Traffic Medicine* 1999;27(3-4):71-80.
8. Waller PF, Olk ML, Shope JT. Parental views of and experience with Michigan's graduated licensing program. *Journal of Safety Research* 2000;31(1):9-15.
9. Ferguson SA, Williams AF. Parents' views of driver licensing practices in the United States. *Journal of Safety Research* 1996;27(2):73-81.
10. Williams AF, Nelson LA, Leaf WA. Responses of teenagers and their parents to California's graduated licensing system. *Accident Analysis and Prevention* 2002;34:835-842.
11. Hartos JL, Eitel P, Simons-Morton BG. Do parent-imposed delayed licensure and restricted driving reduce risky driving behaviors among newly licensed teens? *Prevention Science* 2001;2(2):133-122.
12. Beck KH, Shattuck T, Raleigh R. Parental predictors of teen driving risk. *American Journal of Health Behavior* 2001;25(1):10-20.
13. Hartos JL, Eitel P, Simons-Morton BG. Parenting practices and adolescent risky driving: a three-month prospective study. *Health Education and Behavior* 2002;29:194-206.
14. Goodwin AH, Foss RD. Graduated driver licensing restrictions: awareness, compliance, and enforcement in North Carolina. *Journal of Safety Research* 2004;35(4):367-74.
15. Ferguson SA, Williams AF, Chapline JF, Reinfurt DW, De Leonardis DM. Relationship of parent driving records to the driving records of their children. *Accident Analysis and Prevention* 2001;33:229-234.
16. Wilson RJ, Meckle W, Wiggins S, Cooper PJ. Young driver risk in relation to parents' retrospective driving record. *Journal of Safety Research* 2006;37(4):325-332.
17. Taubman - Ben-Ari O, Mikulincer M, Gillath O. From parents to children--similarity in parents and offspring driving styles. *Transportation Research Part F: Traffic Psychology and Behaviour* 2005;8(1):19-29.
18. Bianchi A, Summala H. The 'genetics' of driving behavior: parents' driving style predicts their children's driving style. *Accident Analysis & Prevention* 2003;36(4):655-659.
19. Mayhew DR, Simpson HM, Pak A. Changes in collision rates among novice drivers during the first months of driving. *Accident Analysis & Prevention* 2003;35(5):683-91.
20. Parker D, Reason JT, Manstead ASR, Stradling SG. Driving errors, driving violations and accident involvement. *Ergonomics* 1995;38(5):1036-1048.

21. Lawton R, Parker D, Manstead ASR, Stradling SG. The Role of Affect in Predicting Social Behaviors: The Case of Road Traffic Violations. *Journal of Applied Social Psychology* 1997;27(14):1258-1276.
22. Armitage P, Berry G. *Statistical methods in medical research*. 3rd ed ed. Oxford ; Boston Blackwell Scientific Publications; 1994.
23. Mesken J, Lajunen T, Summala H. Interpersonal violations, speeding violations and their relation to accident involvement in Finland. *Ergonomics* 2002;45(7):469-483.
24. Lajunen T, Parker D, Summala H. The Manchester Driver Behaviour Questionnaire: a cross-cultural study. *Accident Analysis and Prevention* 2004;36(2):231-8.
25. Ozkan T, Lajunen T. Why are there sex differences in risky driving? The relationship between sex and gender-role on aggressive driving, traffic offences, and accident involvement among young Turkish drivers. *Aggressive Behavior* 2005;31(6):547-558.
26. Nunnally JC. *Psychometric theory*. 2nd ed. New York: McGraw-Hill; 1978.
27. Ministry of Transport. *Motor vehicle crashes in New Zealand 2005, statistical statement calendar year 2005*. Wellington 2006.