Siskind, V. (2023). How Do Young Provisional Drivers Who Crash Early Compare With Those Who Only Crash Later? *Journal of Road Safety*, *34*(3), 46–56.
https://doi.org/10.33492/JRS-D-22-00061

Article Type 1: Peer-reviewed papers

How Do Young Provisional Drivers Who Crash Early Compare With Those Who Only Crash Later?

Victor Siskind[1a]

[1] Centre for Accident Research and Road Safety (CARRS-Q), Queensland University of Technology

Keywords: young drivers, novice drivers, traffic crashes, crash timing

https://doi.org/10.33492/JRS-D-22-00061

Journal of Road Safety

Vol. 34, Issue 3, 2023

Abstract

Much attention has been given to the elevated crash rates of young novice drivers when first driving unsupervised, particularly in the initial six months, but less to the question of whether those who crash during that period are in any way different from those who only crash subsequently. This question was examined in a large cohort of New South Wales novices aged under 25 years at their first licensing, which occurred in the financial year 2007/08. Only post-learner drivers were considered, and divided into three driver groups, early crashers within the first six months, late crashers whose first crash was later, and non-crashers. All factors derivable from the routine records provided were analysed including metropolitan residence and aggregate socio-economic status as determined by post-code of residence. Overall, the largest differences were between those who crashed and those who did not. Females were under-represented among both early and late crashers. Age, aggregate socio-economic status, and metropolitan residence at first licensing did not differ between early and late crashers, but late crashers had spent less time driving supervised. Early crashers had crashed and incurred traffic citations, including for serious offences, more frequently than late crashers, with more crashes judged at-fault. However, exclusion of offences occurring on the same day as a crash reduced the difference between early and late crashers. The difference between crashers and non-crashers was reduced but remained significant.

Key findings

- Characteristics of young provisional drivers who crash early are under-researched
- Crashers differed from non-crashers in sex, age at first licensure and residence
- Early crashers spent more time under supervision than later crashers
- Early crashers had more offences and total crashes than later crashers

Introduction

Deaths and injuries arising from road crashes are a major problem in Australia, as throughout the world. It is well recognised that young people represent a high-risk group within the road system (International Transport Forum-OECD, 2019). In consequence many jurisdictions, including New South Wales (NSW), Australia, have introduced a graduated driver licensing system (GDLS). Young novice drivers undergo a specified number of hours (120 in NSW) learning to drive under supervision, before passing into one or two provisional driving phases (two in NSW, P1, P2) prior to full licensure. During these provisional phases, young novice drivers are unsupervised but are subject to several restrictions affecting, amongst others, limits in the carriage of young passengers at night-time in the first year, all phone use and alcohol consumption (Senserrick & Williams, 2015).

Freed from the restraints of supervision after obtaining a provisional driving permit, there is a noticeable increase

a Corresponding author: Victor Siskind, CARRS-Q, v.siskind@qut.edu.au

in the frequency with which young drivers are involved in road crashes that gradually decline over the following six months (Ma et al., 2013; McCartt et al., 2003; Senserrick et al., 2021). Over the months of initial independent driving, young novice drivers gain a broad range of driving experiences and, due to age related development, their capacity for self-regulation improves, enabling better decision-making (Johnson & Jones, 2011; Watson-Brown et al., 2021). As such, deliberate risky driving behaviours are known to reduce with age, particularly for young male drivers (Rolison & Moutari, 2020). Moreover, research has shown that for each yearly increase in age, crash risk declines (McCartt et al., 2009).

Gender is a known contributing factor to crashes with males of all ages, but particularly for young and newly licensed drivers who are at greater risk. Young novice male drivers have a tendency for a lower risk perception compared to females, consequently engaging in more risky driving behaviours and being over-represented in road crashes (Cordellieri et al., 2016; Møller & Janstrup, 2021). Young drivers with high offending rates, particularly speeding, running a red light and seat belt infringements, are more likely to be involved in a fatal or serious injury crash (Meyer et al., 2021). Recency, seriousness of an offence, and frequency of offences have also been found to increase the likelihood of a crash (Factor, 2014; Walter & Studdert, 2015). Furthermore, young drivers in rural locations tend to perceive speeding, amongst other risky behaviours, as the norm and, coincidently, there are more crashes, particularly for males, in rural areas compared to metropolitan locations (Cullen et al., 2021; Knight et al., 2012).

There is a considerable body of research on young driver crashes and contributing factors in the early months and years of driving. Example results from the New Zealand Drive Study suggest that time spent in the restricted phase of the DDLS, alcohol use and recency of migration to New Zealand are risk factors for crashing and may also affect timing of crash (Begg et al., 2017; Boufous et al., 2023; Lewis-Evans, 2010). There seems however to be little specific research into whether young drivers involved in a traffic crash during the first six months differ from those who crash later or have no recorded crashes in the first few years. Using data obtained from the NSW transport authority, this question has been explored in a cohort of young novice drivers, all under 25 years of age at first learner licence, who obtained the learner licence in the financial year, 2007-2008.

Methods

Personal and demographic data and information on traffic offences and crashes were supplied in three files by the NSW transport authority for all persons who were in the driver licensing system, that is, persons who were in at least one of the learner or the two provisional phases, between 1 July 2007 and 31 January 2014, inclusive.

Data included in each file were:

1. personal, licensing and demographic data including: gender, date of birth, dates of transition to the various phases and postcode at first licencing.
2. offence information, including date and offence code
3. police notified crashes with their dates, severity (fatal, serious (hospitalisation required) or other), at-fault determination and crash type according to Road User Movement (RUM) codes (Transport for NSW, 2019).

Data were linked using a unique identifying number, common to all three files, specially generated by the providers for this study. A combined file of all learners first licensed in the year from 1 July 2007 to 30 June 2008 was created from the three files. Only one offence, the most serious according to a hierarchy to be described below, was selected per offence date, up to a maximum of six dates. Only 2.2 percent of novices had more than six offence dates. All crashes were included in the final combined file, four being the maximum recorded. Scrutiny of the file revealed no missing information apart from a small number of missing postcodes.

Data inclusions and exclusions

Only novices under age 25 years when first licensed and who had transitioned to unsupervised driving were included in the analysis. Three crash categories were created:

- early crashers, novice drivers who had a recorded crash within the first six months of entering the P1 phase
- later crashers, novice drivers who had a recorded crash only after six months since transitioning to P1
- non-crashers, novice drivers who did not have a recorded crash in the observation period. Non-crashers were included for completeness and to provide context

Data for learners aged under 16 years and records with missing postcodes (< 0.01%) or postcodes outside of mainland NSW (0.04%) were excluded. Also excluded were data for individuals with atypical progressions through the system such as omitting one or more phases or progressing too fast through a phase. The latter, comprising 4.8 percent of the cohort, were taken to be a system artefact associated with persons who had reasons for special consideration (such as prior driving experience in another state) or due to transition problems in the first year of the changes to the GDLS. A more detailed description of the final file and its preparation is available in Siskind, Faulks and Sheehan (2019).

Offence categories

Offences were categorised by seriousness into eight hierarchical classes: dangerous, reckless or negligent driving; drink or drug driving; driving while suspended or disqualified; speeding; failure to obey traffic signs and signals; usage offences (driving offences other than those specifically categorised); failure to comply with GDLS rules; and ad-

ministrative offences (Corbett, 2010; Siskind et al., 2019). These were assigned by police officers attending the crash scene. Dangerous/negligent driving, drink or drug driving and speeding (three of the first four categories) were grouped into a further category of serious offences for the purposes of this analysis.

Data analysis

Statistical analysis was by contingency table analysis for discrete variables with the Mantel-Hansen test for ordered variables. The Kruskal-Wallis non-parametric analysis of variance was employed for continuous or quantitative variables. Apart from the analysis of proportions of males and females, all comparisons were sex-specific. Comparisons were firstly between the early and later crashers and secondly between crashers and non-crashers. Because of the large sample sizes, differences of modest statistical significance are to be treated with caution.

Variables considered for analysis were: sex; age at first learner's licence (age at L) and at commencing unsupervised driving (age at P1); time spent under supervision (time in L); numbers of crashes and of offences post P1 in various categories, and category of residence as defined by postcode at first licencing. Postcodes were grouped into 'major cities' or 'rest of state', as determined by the Accessibility/Remoteness Index of Australia classification (Australian Institute of Health and Welfare, 2004) and by quintile of the Socio-Economic Index of Relative Disadvantage as derived from the 2006 Census (Australian Bureau of Statistics, 2008).

To study the evolution of crash types over the period following entry into the P1 phase, the distribution of individual RUM codes in the first and second three-month period and after six months of unsupervised driving was derived. The proportions of single-vehicle crashes in these intervals were also calculated. The relative proportion of crashes occurring on the same dates as a traffic offence, which in most cases can be presumed to refer to the same event, was also determined.

Results

In total, 73,886 novice drivers in the P1 phase were included in the analysis. In Tables 1, 2, 3 and 4 the results of the comparisons between the crash groups are presented.

Table 1 lists the results for all variables other than traffic offence and crash data by early, later and non-crashers. There were statistically significant differences among the subgroups on all variables. The largest differences among these variables were between novice drivers who experienced a crash and those who did not, with smaller differences between early and later crashers, of which few were statistically significant.

Non-crashers were proportionately more female and, among both sex groups, were less likely to live in a major city at learner licensure, older at learner licensure and at transition to P1 and to have spent more time in the learner phase. These novice drivers were also somewhat less likely to have resided in a postcode classified as of greater socioeconomic disadvantage at entry into the licensing system.

Between early and later crashers there was little difference in the proportion of females, age at learner licensing, major city or rest of state residence at learner licensing and socioeconomic classification of postcode residence at learner licensing. There was also little difference in age at first attaining P1 among females at only 5 percent significance, and a small if statistically significant difference among males ($p < 0.001$). Overall, in this sample, females were 2.6 months older than males at L and six months older at P1, differences which are statistically highly significant due in part to the very large numbers involved. Early crashers spent more time in the learner phase.

Frequency of traffic offences as a driver in the post-learner phase are summarised by the three subgroups in Table 2, overall and by the most serious. Mean numbers with standard errors (s.e.) of all and serious offences are presented in Table 3 for early crashers, later crashers, these two combined and non-crashers. Whether a crash occurred on the same day as a traffic offence is also reported in Table 4.

Non-crashers had far fewer reported traffic offences, including serious offences, than early or later crashers after the learner phase. Later crashers had noticeably fewer both traffic offences and total and at-fault crashes than early crashers (Tables 2, 3, 4) in this phase. However, excluding offences associated with a crash reduced the difference between early and later crashes in number of both all and serious offences (Table 3). The difference between crashers and non-crashers is also reduced but remains highly significant.

Multivariate analysis by logistic regression of early versus later crashers and of all crashers versus non-crashers confirmed all these results. There was little difference between early and later crashers in numbers of serious crashes, involving injury or death, while there were only a handful of fatal crashes in both groups (Table 4). All differences noted here were statistically significant to a high degree partly as a consequence of the large numbers involved.

As remarked previously, it is plausible to assume that the majority of crashes and traffic offences that occurred on the same date referred to the same event. Early crashers (63.5%) had a significantly higher proportion of such crashes compared to later crashers (52.7%). According to the police in attendance, the young driver was at-fault in almost all crashes (over 99%). The principal offences associated with these crashes were: dangerous/negligent driving (86%); failure to obey signs or signals (10%); and, drink/drug driving (3%). As noted above, only the most serious offence on a given date was included in the data file, so for example, speeding would not be reported here if dangerous or negligent driving was also cited.

Given the apparent relationship between time of crash and whether the crash was associated with an offence, it might be expected that the most common traffic offence reported among early crashers in the first six months after commencing unsupervised driving is dangerous or negligent driving (64% of total offences). This offence category was relatively uncommon in late crashers and non-crashers

Table 1. Characteristics of early crashers, later crashers and non-crashers

	Crash category						p	
	Early crashers N=2181 (3.0%)		Later crashers N= 6502 (8.8%)		Non-crashers N=65203 (88.2%)		Crashers vs non-crashers	Early vs Late
Characteristic	**N**	**%**	**N**	**%**	**N**	**%**		
Sex								
Males	1333	61.0	3854	59.3	33040	50.4	< 0.0001	0.13
Females	848	39.0	2648	40.7	32163	49.6		
	Mean	**s.e.**	**Mean**	**s.e.**	**Mean**	**s.e.**		
Age at L								
Males	16.4	0.033	16.4	0.019	16.6	0.008	< 0.0001	0.32
Females	16.5	0.045	16.6	0.029	16.8	0.010	< 0.0001	0.18
Age at P1								
Males	17.9	0.046	17.7	0.024	18.2	0.011	< 0.0001	< 0.0001
Females	18.2	0.065	18.1	0.037	18.6	0.014	< 0.0001	0.05
Time in L (months)								
Males	18.9	0.27	17.2	0.12	20.6	0.06	< 0.0001	< 0.0001
Females	21.6	0.40	19.3	0.18	23.2	0.07	< 0.0001	< 0.0001
	N	**%**	**N**	**%**	**N**	**%**		
Region at L								
Males								
Major Cities	993	74.5	2910	75.5	23620	71.5	< 0.0001	0.45
Rest of State	340	25.5	944	24.5	9420	28.5		
Females								
Major Cities	617	72.8	1974	74.6	23016	71.6	0.004	0.28
Rest of State	231	27.2	674	25.4	9147	28.4		
SEIFA Quintiles*								
Males								
1	331	24.9	996	25.9	7469	22.6	< 0.0001	0.39
2	284	21.3	728	18.9	6866	20.8		
3	261	19.6	770	20.0	6632	20.1		
4	257	19.3	744	19.3	6055	18.3		
5	199	14.9	615	16.0	5999	18.2		
Females								
1	224	26.5	664	25.1	7491	23.3	0.024	0.22
2	181	21.4	547	20.7	6884	21.4		
3	160	18.9	491	18.5	6267	19.5		
4	143	16.9	484	18.3	5789	18.0		
5	139	16.4	462	17.4	5726	17.8		

* Lower numbers represent greater levels of socioeconomic disadvantage

at about 8 percent each. Bearing in mind the caveat above about multiple offences, failure to give way (11.8%) and speeding (11.1%) were noted to be the next most common offences in the early crasher group. Among the other two groups the most common category of offence within six months of P1was speeding at over 40 percent of total offences. The GDLS offences in these two groups formed at least 20 percent of total offences in this period although this is likely to be an under-estimate. In the early crasher group, if the dangerous/negligent driving category is excluded, speeding offences and offences involving failure to observe traffic signs and signals then make up 30 percent of traffic offences in the first six months post P1 and GDLS offences at least 20 percent.

Beyond six months after transition to the P1 phase the distribution of offence types is different, with speeding by far the largest category at close to half of early crashers and non-crashers. In late crashers the category, dangerous/negligent driving, comprised 27.5 percent of offences; if this category is excluded, speeding offences also make up almost half of the total.

Table 2. Total and serious reported traffic offences after P1

	Traffic offences post P1						p	
	Early crashers N=2181		Later crashers N=6502		Non-crashers N=65203		Crashers v Non-crashers	Early v Late
	N	%	N	%	N	%		
Number of offences								
Males								
0	101	7.5	375	9.7	13371	39.7	< 0.0001	0.001
1	273	20.3	864	22.4	8178	24.3		
2	262	19.5	836	21.7	4951	14.7		
3	204	15.2	602	15.6	2961	8.8		
4	168	12.5	424	11.0	1751	5.2		
5	162	12.1	357	9.3	1179	3.5		
6	172	12.8	396	10.3	1269	3.8		
Females								
0	142	16.4	590	22.3	20165	60.9	< 0.0001	0.001
1	309	35.9	910	34.4	7483	22.6		
2	196	23.0	563	21.2	3106	9.4		
3	92	10.7	281	10.6	1258	3.8		
4	51	5.9	152	5.7	548	1.6		
5	33	3.5	82	3.1	319	1.0		
6	34	4.6	71	2.7	235	0.7		
Mean / s.e.								
Serious offences* post P1								
	N	%	N	%	N	%		
Males								
0	204	15.2	716	18.6	18361	54.6	< 0.0001	0.001
1	435	32.4	1273	33.0	8651	25.7		
2	331	24.7	950	24.7	4002	12.1		
3	213	15.9	575	14.9	1691	5.0		
4	103	7.7	243	6.3	710	2.1		
≥5	56	4.2	97	2.5	245	0.7		
Mean / s.e.								
Females								
0	230	27.2	879	33.2	23570	73.3	< 0.0001	< 0.0001
1	343	40.5	1072	40.5	6043	18.8		
2	182	21.8	463	17.5	1738	5.4		
3	50	5.9	146	5.5	569	1.8		
4	23	2.7	69	2.6	169	0.5		
≥5	16	1.9	19	0.7	74	0.3		

*All crashers

In all three groups drink/drug and improperly licensed driving are reported relatively uncommonly in each period, each making up 2-3 percent of total offences. Examination of a sample of drivers in this cohort suggests that the proportion under-reported may be of the order of 5 percent. From the same sample it appears that the proportion of speeding offences under-reported is even less. Serious offences are less subject to under-reporting.

In terms of the types of first post-P1 crash experienced by these young drivers, there is very little difference in the distribution of the most common RUM codes between the novice drivers who crashed within three months of reaching P1, crashed in the next three months or had their first crash later (Table 5). All other RUM codes had frequencies of 2 percent or less. Nor did the proportion of single vehicle crashes differ much in these three intervals (⩽ 3 months, 27.0%; 4 - 6 months, 26.0%, ⩾ 6 months, 27.1%).

Table 3. Means and standard errors (s.e.) of numbers of offences

	Traffic offences post P1							
	Early crashers		Later crashers		All crashers		Non-crashers	
	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.
Males								
All offences	2.92	0.051	2.65	0.029	1.41	0.009	2.72	0.025
Excluding crash-associated	2.17	0.048	2.06	0.026	2.09	0.055	1.41	0.009
Serious offences*	1.82	0.036	1.65	0.020	1.69	0.041	0.77	0.006
Excluding crash-associated	1.15		1.12		1.13		0.77	0.006
Females								
All offences	1.81	0.052	1.63	0.028	1.68	0.059	0.68	0.006
Excluding crash-associated	1.12	0.048	1.10	0.027	1.07	0.055	0.68	0.006
Serious offences	1.22	0.042	1.06	0.020	1.10	0.047	0.37	0.004
Excluding crash-associated	0.62	0.032	0.59	0.018	0.60	0.037	0.37	0.004

* dangerous/negligent driving, drink/drug driving, speeding

Discussion

Young drivers who experienced crashes in the first few months after their period of supervised driving differed in several respects from young drivers who did not crash. The young drivers who crashed are somewhat younger both at first licensing and on reaching the provisional phase, more often male and spent less time driving under supervision. In addition, the young drivers who crashed tended to be from major cities and postcodes classified as more socio-economically disadvantaged. On the other hand, there were fewer differences in these respects between the young novice drivers who crashed within the first six months of unsupervised driving and novices who crashed later. Two characteristics of note were later crashers spent less time driving under supervision and were slightly younger.

In respect of traffic offence histories, here too the largest differences are between young drivers who crashed compared to young drivers who did not crash with smaller but statistically significant differences between early and later crashers. The former had on average more total offences and also more serious offences reported than the latter who in turn had many more than non-crashers, which was in large part due to the greater number of offences occurring on the same day as crashes.

The results for serious offences are consistent with a recent study using crash data from Victoria where repeat serious offenders were significantly more likely to be involved in a crash within the following three years (Meyer et al., 2021). In the first six month period after reaching P1, early crashers incurred many more citations for dangerous or negligent driving than later crashes or non-crashers, whose principal reported offence was speeding. After six months, speeding was the main traffic offence reported in the current datafile for all three groups, although in this period dangerous/negligent driving comprised over a quarter of offences in later crashers. Due to its low position in the offence hierarchy GDLS offences may be under-reported.

There were also notable differences between early and later crashers in their total, severity and at-fault crash experience, with the former having significantly more of all crash classes. Some 64 percent of the crashes of early crashes occurred on the same date as a traffic offence compared with 54 percent of later crashes. Almost all such crashes, police reported the young driver was at-fault.

The combination of factors that contribute to young driver crashes during the first six months of independent driving implicate age and, particularly, driving inexperience (McCartt et al., 2009). Research has found that the combination of road conditions, speed choice, inexperience, and loss of control account for a large proportion of variance in young drivers' single vehicle crashes (Rolison & Moutari, 2020). The first six months reflects the most dramatic decline in crashes with single vehicle, night-time and weekend crashes, and crashes when carrying two or more passengers having the greatest decreases for young drivers (Mayhew et al., 2003). Furthermore, in the first six months of independent driving the crash risk of youths who drive more frequently decreases, with one study finding the pivotal amount of driving at 73 hours (Li et al., 2017). Given the average amount of time a young driver typically drives during their first six months of independent licensure, 73 hours is approximately aligned with five to six months (Li et al., 2017; Mayhew et al., 2003). These findings will become more relevant when there is information on the personal information and on-road exposure of young drivers who crash while in the GDL system from studies suggested below.

There is an extensive literature on reasons for and circumstances of young driver crashes including studies of cognitive and psychological factors. One study of interest used an American database containing detailed analyses of a representative sample of serious crashes, classified the crashes of teenage drivers (under 19 years of age). The authors found that errors of judgement or inadequate attention led to the great majority of instances where the teenaged drivers was judged at fault, with aggressive driving being uncommon at about 3 percent (Curry et al.,

Table 4. Crash experience post P1

	Numbers of crashes post P1				
	Early crashers		Later crashers		
	N	%	N	%	p
Total					
Males					
1	1127	84.6	3353	92.2	< 0.0001
2	183	13.6	283	7.3	
3/4	23	1.7	18	0.5	
Females					
1	762	89.8	2529	95.5	< 0.0001
2	76	9.0	114	4.3	
3/4	10	1.2	5	0.2	
Serious crashes					
Males					
0	825	61.9	2416	62.7	0.24
1	474	35.6	1375	35.7	
≥ 2	34	2.5	63	1.6	
Females					
0	454	53.5	1529	57.7	0.013
1	377	44.5	1094	41.3	
≥ 2	17	2.0	26	1.0	
At fault crashes					
Males					
0	354	26.6	1434	37.2	0.0001
1	886	66.6	2310	59.9	
≥ 2	91	6.8	110	2.9	
Females					
0	263	31.0	1187	44.8	0.0001
1	545	64.3	1420	53.6	
≥ 2	40	4.7	41	1.6	
Fatal crashes					
Males					
0	1332	99.3	3836	99.5	0.23
1	10	0.7	18	0.5	
Females					
0	854	99.6	2637	99.5	0.69
1	3	0.4	12	0.5	
Crashes on the same date as a reported traffic offence					
Males					
0	403	30.0	1666	43.2	< 0.0001
1	868	64.7	2110	54.8	
≥ 2	71	5.3	78	2.0	
Females					
0	299	34.9	1292	48.8	< 0.0001
1	523	61.0	1317	49.7	
≥ 2	35	4.1	40	1.5	

2011). However, the timing of crashes relative to the commencement of unsupervised driving was not considered. Cooper and his colleagues (1995, p. 104) suggested that "those new drivers whose attitudes, access to vehicles and

Table 5. Proportions of crash types by Road User Movement (RUM) codes in three periods after start of unsupervised driving

		Period since the start of unsupervised driving		
RUM code		≤ 3 months	4 - 6 months	≥ 6 months
30	Rear end, vehicle in same direction	23.6	26.0	26.6
21	Right through, vehicle in opposing direction	12.0	12.0	11.0
10	Cross traffic, vehicle from adjacent direction	9.1	10.1	8.7
71	Left off carriageway, hit object	6.8	6.3	7.1
13	Right near, vehicle from adjacent direction	5.2	3.4	4.8
32	Right rear, vehicle in same direction	4.2	4.3	3.4
20	Head on, vehicle in opposing direction	4.0	2.9	3.2
81	Off carriageway, left on bend, hit object	3.8	3.1	3.9
	Others	31.3	31.9	31.3
Total		68.7	68.1	68.7

reasons for driving expose them to an excessive level of risk" may crash sooner rather than later but they do not further define attitudes. McCartt and colleagues (2009, p. 209) stated that "the weight of evidence suggests a steep learning curve among drivers of all ages". One would therefore expect there to be some change over the first months of unsupervised driving in the types of crashes experienced by these novices although this is not observed in this study.

Study limitations

Only crashes reported to police are included in the database and there may be some degree of under-reporting. Since reporting of property damage only crashes requires that the vehicle(s) be towed away, under-reporting is unlikely to be common enough to influence the results and is not likely to occur more often in one crash group than another. Similarly crashes which occur in another state, which would not appear in these data, are likely to be equally common in both groups.

Routinely collected data such as these have limited explanatory value concerning the social and cognitive factors underlying the observed differences, in particular those between early and late crashers. Also unavailable is information on on-road exposure, a common deficiency in data collected for administrative purposes. It has been assumed that drivers in the three crash classes drive on average similar amounts, although it would be of interest to know to what extent this is true.

Conclusions

The principal aim of this study was to determine if there were ways in which young novice drivers who crash within six months of entering the provisional, unsupervised phase of the GDL system differed from those who crashed after six months. The early crashers spent about two months longer in the supervised phase had somewhat more traffic offences and crashes (both total and serious crashes) with crashes judged by attending police to be more likely at fault. In addition, the crashes of early crashers were more often associated with a traffic offence.

The study also explored the differences between young novice drivers who do not crash after commencing to drive unsupervised, at least during the first few years and the novices who crashed. The groups were found to differ in several respects. The novices who did not crash within the observation period were more likely to be female, older at first licensing and at starting to drive unsupervised, to have spent longer in the supervised phase and to be residents of major cities and suburbs of higher socio-economic status at first licensure. They also had far fewer total traffic offences and serious offences.

In order for these results to be of more practical value there needs to be a study of the attitudes and personality traits of young drivers who crash early or later as defined in the current study. This could readily be carried out in a large database, if such exists, containing information on attitudes, personality and exposure collected by questionnaire or interview at or near the start of the learner phase, plus driver histories over at least four years.

Acknowledgements

The data used in this study were provided by Transport for New South Wales, to whom I am grateful. Dr Ian Faulks was instrumental in securing the data.

Author contributions

Victor Siskind planned and executed the analysis, and also compiled and edited the manuscript.

Funding

No funding was provided for this research.

Human Research Ethics Review

The Queensland University of Technology (QUT) Human Research Ethics Committee assessed this research as meeting the conditions for exemption from HREC review in November 2013 and approval in accordance with section 5.1.22 of the National Statement on Ethical Conduct in Human Research (2007) (Exemption number: 1400001000; Exemption number: 1400001002; Exemption number: 1600000204).

Data availability statement

Data were provided by the New South Wales Government, Transport for New South Wales on the understanding that they not be shared with third parties.

Conflicts of interest

The author declares that there are no conflicts of interest.

Submitted: October 25, 2022 AEDT, Accepted: August 05, 2023 AEDT

References

Australian Bureau of Statistics. (2008). *Socio-economic Indexes for Areas (SEIFA), 2006*. https://www.abs.gov.au/websitedbs/censushome.nsf/home/seifapast?opendocument&navpos=260

Australian Institute of Health and Welfare. (2004). *Rural, regional and remote health: A guide to remoteness classifications*. AIHW. https://www.aihw.gov.au/getmedia/9c84bb1c-3ccb-4144-a6dd-13d00ad0fa2b/rrrh-gtrc.pdf.aspx?inline=true

Begg, D., Brookland, R., & Connor, J. (2017). Associations of repeated high alcohol use with unsafe driving behaviors, traffic offenses, and traffic crashes among young drivers: Findings from the New Zealand Drivers Study. *Traffic Injury Prevention*, *18*(2), 111–117. https://doi.org/10.1080/15389588.2016.1224345

Boufous, S., Möller, H., Patton, G., Woodward, M., Stevenson, M. R., Senserrick, T., Mclean, R., Cullen, P., Wang, A., Rogers, K., & Chen, H.-Y. (2023). Acculturation and risk of traffic crashes in young Asian-born Australian drivers. *Injury Prevention*, *29*(1), 74–78. https://doi.org/10.1136/ip-2022-044718

Cooper, P. J., Pinili, M., & Chen, W. (1995). An examination of the crash involvement rates of novice drivers aged 16 to 55. *Accident Analysis & Prevention*, *27*(1), 89–104. https://doi.org/10.1016/0001-4575(94)00052-n

Corbett, C. (2010). Driving offences. In F. Brookman, M. Maguire, H. Pierpoint, & T. Bennett (Eds.), *Handbook on Crime*. Willan Publishing.

Cordellieri, P., Baralla, F., Ferlazzo, F., Sgalla, R., Piccardi, L., & Giannini, A. M. (2016). Gender effects in young road users on road safety attitudes, behaviors and risk perception. *Frontiers in Psychology*, *7*, 1412. https://doi.org/10.3389/fpsyg.2016.01412

Cullen, P., Möller, H., Woodward, M., Senserrick, T., Boufous, S., Rogers, K., Brown, J., & Ivers, R. (2021). Are there sex differences in crash and crash-related injury between men and women? A 13-year cohort study of young drivers in Australia. *SSM - Population Health*, *14*, 100816. https://doi.org/10.1016/j.ssmph.2021.100816

Curry, A. E., Hafetz, J., Kallan, M. J., Winston, F. K., & Durbin, D. R. (2011). Prevalence of teen driver errors leading to serious motor vehicle crashes. *Accident Analysis & Prevention*, *43*(4), 1285–1290. https://doi.org/10.1016/j.aap.2010.10.019

Factor, R. (2014). The effect of traffic tickets on road traffic crashes. *Accident Analysis & Prevention*, *64*, 86–91. https://doi.org/10.1016/j.aap.2013.11.010

International Transport Forum-OECD. (2019). *Road safety report 2018: Australia*. OECD. https://www.itf-oecd.org/sites/default/files/australia-road-safety.pdf

Johnson, S. B., & Jones, V. C. (2011). Adolescent development and risk of injury: using developmental science to improve interventions. *Injury Prevention*, *17*(1), 50–54. https://doi.org/10.1136/ip.2010.028126

Knight, P. J., Iverson, D., & Harris, M. F. (2012). Early driving experience and influence on risk perception in young rural people. *Accident Analysis & Prevention*, *45*, 775–781. https://doi.org/10.1016/j.aap.2011.10.005

Lewis-Evans, B. (2010). Crash involvement during the different phases of the New Zealand Graduated Driver Licensing System (GDLS). *Journal of Safety Research*, *41*(4), 359–365. https://doi.org/10.1016/j.jsr.2010.03.006

Li, Q., Guo, F., Klauer, S. G., & Simons-Morton, B. G. (2017). Evaluation of risk change-point for novice teenage drivers. *Accident Analysis & Prevention*, *108*, 139–146. https://doi.org/10.1016/j.aap.2017.08.007

Ma, A., Rees, P., McLean, J., Hillard, E., & Bruton, G. (2013). Developing a Safer Drivers Course for young learner drivers. *Australasian College of Road Safety Conference, Adelaide, South Australia, 6-8 November 2013*. https://acrs.org.au/files/papers/67%20Ma_NRP.pdf

Mayhew, D. R., Simpson, H. M., & Pak, A. (2003). Changes in collision rates among novice drivers during the first months of driving. *Accident Analysis & Prevention*, *35*(5), 683–691. https://doi.org/10.1016/s0001-4575(02)00047-7

McCartt, A. T., Mayhew, D. R., Braitman, K. A., Ferguson, S. A., & Simpson, H. M. (2009). Effects of age and experience on young driver crashes: review of recent literature. *Traffic Injury Prevention*, *10*(3), 209–219. https://doi.org/10.1080/15389580802677807

McCartt, A. T., Shabanova, V. I., & Leaf, W. A. (2003). Driving experience, crashes and traffic citations of teenage beginning drivers. *Accident Analysis & Prevention*, *35*(3), 311–320. https://doi.org/10.1016/s0001-4575(02)00006-4

Meyer, D., Muir, S., Silva, S. S. M., Slikboer, R., McIntyre, A., Imberger, K., & Pyta, V. (2021). Modelling the relationship of driver license and offense history with fatal and serious injury (FSI) crash involvement. *Journal of Safety Research*, *79*, 83–93. https://doi.org/10.1016/j.jsr.2021.08.008

Møller, M., & Janstrup, K. H. (2021). Crash involvement among unlicensed 17 year old drivers before and after licensing at 17 was allowed. *Accident Analysis & Prevention*, *156*, 106109. https://doi.org/10.1016/j.aap.2021.106109

Rolison, J. J., & Moutari, S. (2020). Combinations of factors contribute to young driver crashes. *Journal of Safety Research*, *73*, 171–177. https://doi.org/10.1016/j.jsr.2020.02.017

Senserrick, T., Boufous, S., Olivier, J., & Hatfield, J. (2021). At what stages of licensing do graduated driver licensing systems reduce crashes? Example from Queensland, Australia. *Accident Analysis & Prevention*, *152*, 105989. https://doi.org/10.1016/j.aap.2021.105989

Senserrick, T., & Williams, A. (2015). *Summary of literature of the effective components of graduated driver licensing* (Austroads Publication No. AP-R476-15). Austroads. https://austroads.com.au/publications/road-safety/ap-r476-15

Siskind, V., Faulks, I. J., & Sheehan, M. C. (2019). The impact of changes to the NSW graduated driver licensing system on subsequent crash and offense experience. *Journal of Safety Research*, *69*, 109–114. https://doi.org/10.1016/j.jsr.2019.02.006

Transport for NSW. (2019). Definitions and notes to support road crash data. *NSW Centre for Road Safety*. https://roadsafety.transport.nsw.gov.au/downloads/definitions-notes.pdf

Walter, S. J., & Studdert, D. M. (2015). Relationship between penalties for road traffic infringements and crash risk in Queensland, Australia: a case-crossover study. *International Journal of Epidemiology*, *44*(5), 1722–1730. https://doi.org/10.1093/ije/dyv148

Watson-Brown, N., Senserrick, T., Freeman, J., Davey, J., & Scott-Parker, B. (2021). Self-regulation differences across learner and probationary drivers: The impact on risky driving behaviours. *Accident Analysis & Prevention*, *154*, 106064. https://doi.org/10.1016/j.aap.2021.106064