

Traffic Crash Experience of a Cohort of Young Queenslanders in the last decade of the twentieth century.

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Introduction

While there are many cross-sectional estimates of casualty and fatal crash rates among young adults, I have found few reports of attempts to follow a large cohort of such persons over time. In New Zealand a cohort of about nine hundred young people was established and followed for a variety of outcomes, including traffic crashes (Horwood and Fergusson, 2000), but this number is somewhat modest for estimation purposes.

A cohort of school students, spread over a number of grades at enrolment, was studied by Waller and her colleagues in Michigan. Almost 14,000 who were known to have obtained drivers licences in that state were followed for an average of 7 years (Waller et al, 2001). The analogous figure for our cohort is 9 years (range 3 to 12 years). In Waller's cohort, 58% had a reported traffic crash as driver (sic) during the follow-up period, presumably not all involving injuries. An equivalent proportion in the Queensland cohort is difficult to calculate: 11,080 crashes among vehicle controllers in our cohort were identified, the majority involving only property damage, but including persons with more than one crash. The proportion of cohort members who ever obtained a licence is unknown, but if we assume a figure of 90% for both the licensed and the distinct individuals, the crash proportion over an average of 9 years works out at under 20%. Waller's group concentrated on "serious" offences and "at-fault accidents", making direct comparisons with their results unhelpful.

Of indirect relevance are the linkage studies from Western Australia and New Zealand, which suggest that a substantial proportion of hospitalisations for traffic crashes do not come to the notice of the police and transport authorities (Rosman and Knuiman, 1994; Alsop and Langley, 2001). Thus the rates estimated here are undoubtedly under-estimates.

It is the aim of this paper to estimate the age-specific and cumulative risk with age to teenaged and young adult Queenslanders of involvement in a traffic crash, and in particular of being injured in such a crash. Crashes with only property damage have been largely ignored since they are notorious subject to under-reporting by those concerned, even if the circumstances and amount of damage make them legally reportable. Two approaches have been used, the first by following the crash fortunes to age 25 years of a cohort of school students enrolled in 1988 and 1989 to the end of the year 2000; the second estimates crash rates cross-sectionally from 1992 to 2000 for Queensland residents of the same ages as the bulk of the school cohort in those years.

Methods

The cohort mentioned above, of Grade 10 high school students aged mainly 14 or 15 years, was assembled as part of a trial of a drink driving education package. We have described the trial and presented follow-up results at a previous conference (Siskind et al 1998). At that point Queensland Transport had identified just over 80% of the cohort in its licensing and traffic offence files. More recently Queensland Transport identified those members of the cohort who could be matched in the Crash Database.

Two files were generated, one of cohort members with injuries, classified as fatal, hospitalised, needing medical attention, and minor. These are the data analysed in this report. It seems clear that completeness of reporting to the police and hence to the Crash Database would fall off with severity of injury. The fatal and hospitalised categories, described in what follows as “serious”, will therefore receive particular attention. The second file was of vehicle controllers – drivers, motor- and pedal cyclists, and even pedestrians - who had been involved in a crash, whose severity was similarly categorised with the addition of the property damage class. The categorisation was based on the most severe injury sustained by any person involved in the crash, not necessarily the matched cohort member who had been the vehicle controller. Only passing mention will be made of these data. The injury file contained just under 4,000 records, the other file just over 11,000 records.

All analyses are sex-specific: females tend to have lower levels of involvement in traffic crashes and are moreover liable to change their surnames after marriage, especially in young adulthood. This would lead to progressive under-enumeration of incidents with age. Marriage rates by age are available and could notionally be used to correct the denominators if one could be confident that only a negligible proportion of young women retained their maiden names. At all events, this has not been attempted. In general it is not entirely clear what the appropriate denominator might be. Some of the entries in the matching file or the Database will be in error. A certain amount of interstate and overseas movement may be anticipated in this age group, also conceptually estimable but not attempted. Nonetheless the numbers of males and females in the entire cohort, approximate 30,700 each, have been used as divisor. Crash numbers are also subject to under-ascertainment, since incidents in other jurisdictions will not appear on the Database. Thus rate estimates will be conservative.

Age at crash was calculated from dates of birth and of crash. All crashes, including second and third crashes, are considered. The upper age limit of 25 was chosen as most cohort members were born prior to 1975, some 4% in 1975 itself. Age-specific and cumulative rates of serious injury and injury in all classes to vehicle controllers, including pedal cyclists, and total injuries including passengers are calculated and displayed. Injured pedestrians are considered separately. The cumulative rates at age 25, with and without pedal cyclists, are given with 95% confidence intervals computed assuming a Poisson distribution.

Results

There were 102 deaths among members of this cohort, four of which occurred at age 26; of the remaining 98, 5 were among pedestrians (all male), 55 among male drivers or motor-cyclists, 2 among male pedal cyclists and 12 in male passengers. Among

females 17 drivers and 7 passengers were killed. A further 55 cohort members survived crashes in which some other person died.

Numbers of serious crashes among vehicle controllers and total injury crashes among vehicle controllers and passengers are given by sex in Table 1. Figure 1 gives age-sex-specific rates of serious and total crash injury in vehicle controllers and of total injury in all cohort members. Cumulative rates are presented in Figure 2.

Crashes in all classes and for both sexes are most numerous from ages 18 to 21 years. Numbers decline thereafter, more sharply among young women. The proportion of serious crashes is reasonably constant at around 34% across this age range among males, but decreases from 27% in females under 20 years of age to 18% in the last three years of the range. This may be a genuine reflection of trend in young women drivers or due to some degree to the name-changing practice alluded to above.

Table 1. Numbers of serious crashes among controllers and total injury crashes among vehicle controllers and passengers identified in the school-based cohort.

Age	Males			Females		
	Drivers etc		All	Drivers etc		All
	Serious	Total	Total	Serious	Total	Total
17	29	102	123	18	63	80
18	67	216	283	44	165	237
19	79	232	300	44	165	243
20	79	229	298	37	151	205
21	74	207	272	32	163	213
22	69	172	227	31	121	167
23	65	193	231	11	92	131
24	48	137	169	11	78	105
25	48	152	176	22	70	95
Total	558	1646	2079	250	1068	1476
Rate/1000	18.2	53.6	67.7	8.1	34.8	48.1
95% CI	16.7-19.7	51.1-56.2	64.8-70.7	7.2-9.2	32.7-36.9	45.7-36.9
Cyclists	40	144		11	37	
Rate/1000	1.3	4.7		0.4	1.2	

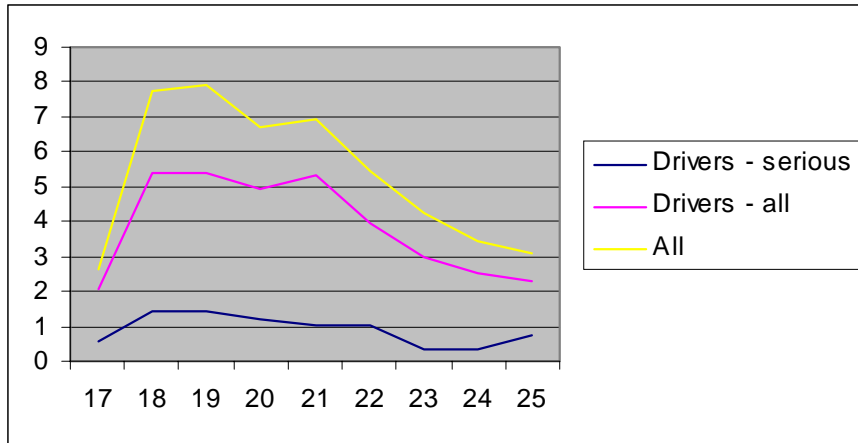


Fig 1b Crash Rates per thousand in females, by age.

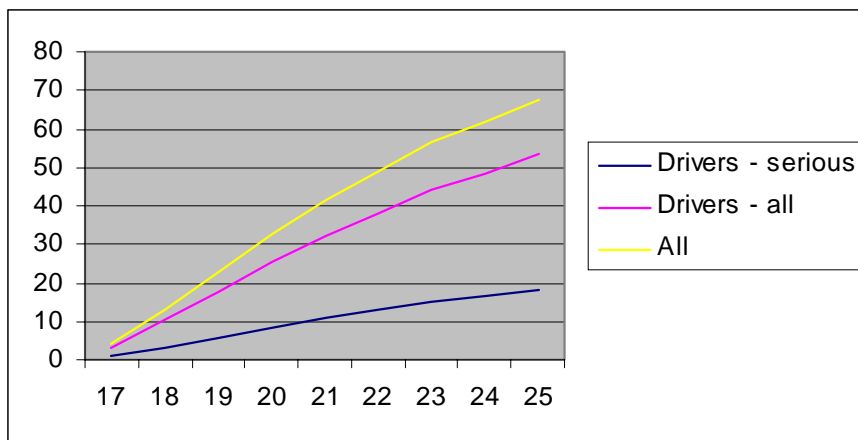


Fig 2a Cumulative crash rates per thousand in males, by age.

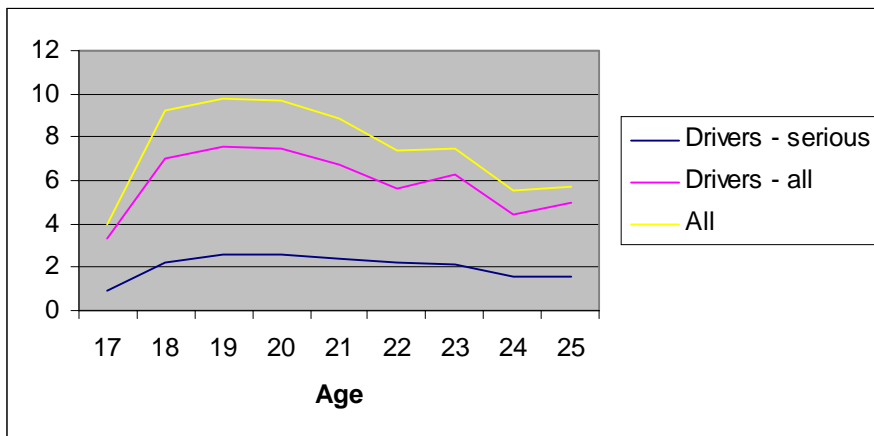


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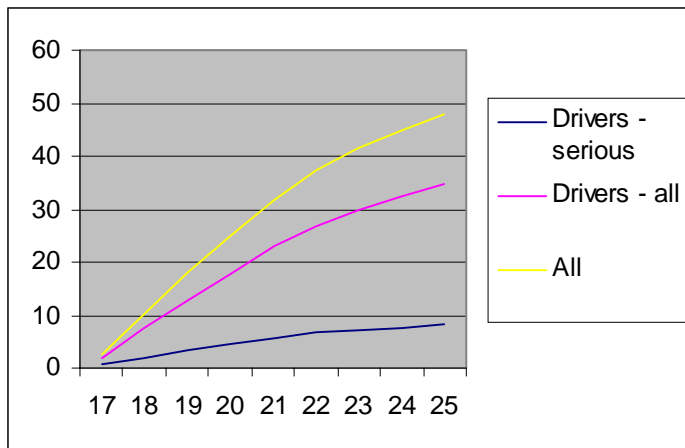
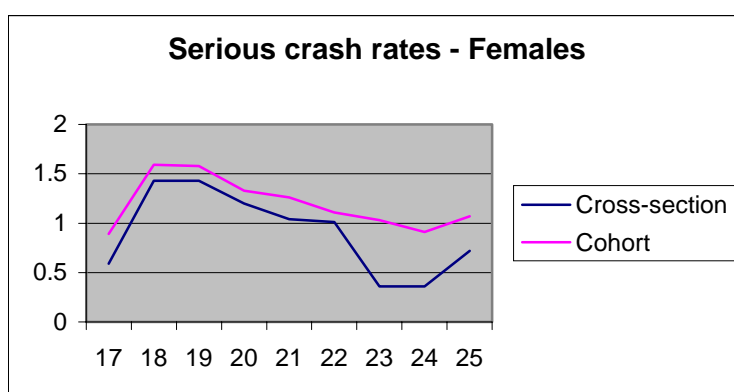
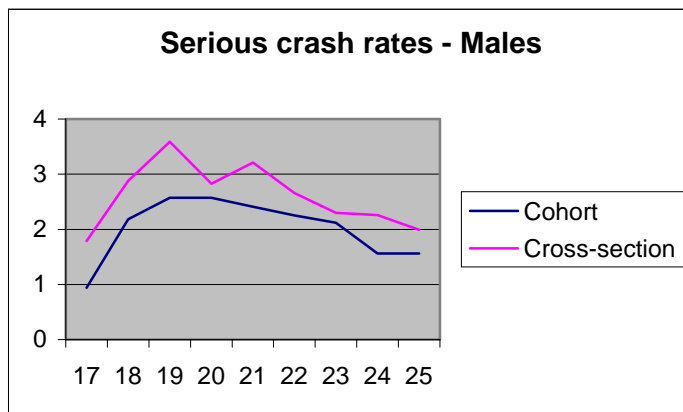


Fig 2b Cumulative crash rates per thousand in females by age.

Cross-sectional analysis

In this comparison only serious injuries (fatal and hospitalised) are considered. The cross-sectional rates (by sex) presented in the figures below are weighted averages of age-specific rates per thousand population, with the weights being proportional to the numbers in the cohort who would be of that age in the relevant years. The two curves for males are roughly parallel, with the cross-sectional rates 20-30% greater than the cohort rates. Among the females the rates are also roughly parallel until age 22, but closer, the cross-sectional rates being about 10% greater. From age 23 years on, the cross-sectional rates fall off more sharply, presumably due to the change of surnames on marriage. The lower cohort rates suggest problems with the denominators used in their calculation and/or with the identification of cohort members, but the discrepancy between the sexes is hard to explain.





Other results

Ratio of serious to minor injuries: In males this ratio is reasonably constant at 0.54:1, ie 35% of injuries are in the serious categories. For females the ratio decreases from about 0.4:1 below age 20 and about 0.3:1 from ages 20 to 22 to around 0.25:1 after age 22. overall from ages 17 to 25, 25% of female injuries were serious, appreciably lower than the male proportion.

Place of crash in relation to place of schooling. The schools attended by the members of the cohort were on file, and were classified as urban (Brisbane Statistical Division and Gold Coast City) or rural (the rest of the state). The SLAs in which the crashes reportedly occurred were similarly classified. The schools which took part in the original program were all State schools, with few boarders from distant regions. Thus the urban-rural category of the schools and the residences of their attendees may be taken to coincide, although some minor misclassification can be expected.

Overall over 80% of subsequent crash injuries were incurred in the same regional category as the school. Serious injury crashes showed a similar pattern, and the results were very similar in males and females.

Table 2. Urban or rural schooling versus urban or rural place of crash.

\ Crashes	Urban				Rural			
	All		Serious		All		Serious	
	n	%	n	%	n	%	n	%
Schools								
Urban:	1528	81.1	406	79.8	249	13.2	87	13.3
Rural:	355	18.9	103	20.2	1640	86.8	565	86.7
Total	1883		509		1889		652	

Time from licensing to first crash. For a subset of 1692 males and 1512 females enrolled in 1988, age at obtaining a driver's licence was known. In this subset, 209 persons, 134 males and 75 females, were reported to have been involved as controllers in at least one injury crash. Their age at this event was also known. By subtraction, the approximate time from licensing to first crash can be calculated. Although the data are insufficient in number and precision for a thorough analysis, one can throw some light on the age versus experience debate by calculating for each

age at licensing the average time to first crash. If experience is the dominant factor, time to first crash should on average be roughly constant; if age is the crucial element, time to first crash should decrease by about one year with age at licensing. Simple linear regression analysis of time to first crash on age at licensing estimates the coefficient of the latter as -1.05 ± 0.21 years in males and -0.64 ± 0.17 in females; this suggests that age may be more important than experience. However 88% of males and 79% of females were licensed at 17 or 18 years of age, so that this conclusion is tentative at best.

References

- Alsop J and Langley J. Under-reporting of motor vehicle crash victims in New Zealand. *Accid Anal Prev* 2001, 33:353-359.
- Horwood LJ and Fergusson DM. Drink driving and traffic accidents in young people. *Accid Anal Prev* 2000, 32:805-814.
- Rosman DL and Knuiman MW. A comparison of hospital and police road injury data. *Accid Anal Prev* 1994, 26:215-222.
- Waller PF, Elliott MR, Shope JT, et al. Changes in young adult offense and crash patterns over time. *Accid Anal Prev* 2001, 33: 117-128.