

# Passenger Injuries in Crashes in Western Australia; 1997–2000

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## Biography

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## Abstract

**Background** A substantial proportion of persons injured in vehicle crashes are passengers. The effect of passengers is not the same for younger and older drivers. There is a negative effect on crash risk for younger drivers and a positive benefit for older drivers.

**Methods** A population-based study using the West Australian Road Injury Database to compare the crash rates of first year drivers with those driving from more than a year. Crash rates per 10,000 licensed drivers for first year drivers were compared with the rates for drivers with more than one year's driving experience.

**Results** Between 1997 and 2000 there were 3589 passengers injured. Male and female passengers were injured equally as often. A passenger was 13 times more likely to be injured if the driver had been licensed for <12 months than with a driver licensed for more than 12 months. Drivers with <12 months driving experience were eight times more likely than drivers with a longer licensing period to be involved in a fatal passenger injury; six times more likely to be involved in a passenger hospitalisation than drivers licensed >12 months. Sixty-three per cent of passengers wore a seat belt, 15% did not (22% unknown). Passengers aged 0 to 16 years and those over 35 years were more likely to wear a seat belt than passengers in other age groups.

**Discussion** The proportion of injured passengers in this study was similar to that seen in overseas studies before restrictions on carrying passengers were introduced for probationary drivers. The introduction of passenger restrictions in WA needs to be considered or other changes to licensing such as increasing the licensing age.

## 1. INTRODUCTION

In WA, almost a third of fatal and serious injuries in motor vehicle crashes affect passengers. In 2000, 62 passengers were killed, and of these 15 (24%) were aged between 17 and 20 years [1]. It is a concern that so many young people are killed or injured every year. This problem is not unique to Australia, but occurs in other places as well. For example, 63% of teenage fatalities in motor vehicle crashes the USA occurred when another teenager was driving [2].

The effect that passengers have on driver's crash risk is not the same for inexperienced and experienced drivers. The crash risk for inexperienced drivers increased two to 12 times when passengers were present compared to the risk for experienced drivers [3-5]. This is because inexperienced drivers use more cognitive capacity to drive the car and have less attention to spare for passengers.

Passengers can distract the driver's attention from the road. This reduces the amount of attention they can devote to driving the car and to the road ahead. Thus their ability to detect and react to hazards is lowered [6-8]. In experiments, drivers with a speaking passenger reacted slower to hazards than drivers who were alone [9]. Probationary drivers have a higher crash rate than more experienced drivers either by kilometres driven or per 100,000

licensed drivers. Therefore teenage passengers are travelling with probationary drivers with a high crash risk.

Peer passengers are a particular problem, partly because adolescents are susceptible to peer pressure [10]. Some behaviours that have been recorded in the presence of peer passengers are; driving after drinking alcohol, speeding, overtaking dangerously, not wearing seat belts, tail-gaiting and deliberate reckless acts [11-13]. A study found peer passengers were present in 85% of dangerous driving incidents among 16–19 year old drivers [14,15]. Compared to driving alone the presence of passengers increased the crash risk three fold [3,16,17].

The aim of this study was to examine the passenger injury rates for first year drivers and for more experienced drivers.

## **2. METHODS**

This was a population-based study using data from the Western Australian Road Injury Database that is held at the Injury Research Centre, The University of Western Australia. The database contains information about the crash from the Western Australian Police Service and The Main Roads Department. In WA, crashes must be reported to the police if a person is injured or if damage to property exceeds \$1000 in value. Single vehicle, rural and less severe crashes are under-reported to the police [18]. To reduce the error associated with underreporting, the crash information used in this study was from severe crashes where a passenger was fatally injured or hospitalised. The time period chosen was 1997–2000 in Western Australia (WA).

Drivers in their first year of driving were identified from their date of licensing. Time since licensing was coded as 12 months or less or more than 12 months. Sixty-four first year drivers older than 25 years were excluded from the analysis because it was not possible to verify that this was their first licence. The number and rate of passenger injuries were calculated. The rates used were the crude, age-, and sex-specific passenger injury rate per 10,000 licensed drivers. The numbers of licensed drivers per year were obtained from the Department of Planning and Infrastructure (Licensing)

These variables were used in this study: passenger and driver age and sex, speed, blood alcohol concentration (mg/dl) (bac), time of crash, and seat belt wearing.

All data manipulation and statistical analysis were conducted in SPSS [19].

## **3. RESULTS**

The date of licensing was missing for 838 drivers in the Road Injury Database and these were excluded from the analysis. Comparison of those with and without a licensing date showed the two groups were similar with respect to sex, age, passenger injury severity, and proportion of crashes attended by the police.

Over four years, 3589 passengers were injured. Table 1 shows the age and sex of the injured passengers by the time since the driver obtained their driving licence. Some crashes resulted in more than one injured passenger.

**Table 1 Age and sex of injured passengers by time of driver licensing, WA 1997-2000**

Age group	<12 mo				Total	> 12mo				Total
	M		F			M		F		
	n	%	n	%		n	%	n	%	
0-5	18	4.6	11	4.1	29	105	6.8	101	7.2	206
6-11	8	2.1	11	4.1	19	96	6.2	105	7.5	201
12-16	91	23.4	67	25.1	158	151	9.8	133	9.5	284
17-20	153	39.3	86	32.2	239	322	20.9	262	18.8	584
21-24	33	8.5	9	3.4	42	222	14.4	154	11.0	376
25-29	19	4.9	12	4.5	31	159	10.3	120	8.6	279
30-39	12	3.1	9	3.4	21	155	10.1	116	8.3	271
40-49	6	1.5	12	4.5	18	69	4.5	73	5.2	142
50-59	6	1.5	3	1.1	9	25	1.6	52	3.7	77
60-69	3	0.8	3	1.1	6	12	0.8	39	2.8	51
>70	40	10.3	44	16.5	84	222	14.4	240	17.2	462
Total	389	100.0	267	100.0		1538	100.0	1395	100.0	2933

### Passenger injury rates

Table 2 shows the passenger injury rate per 10,000 licensed drivers by the severity of the injury. Drivers with less than 12 months driving experience were eight times more likely to be involved in a fatal passenger injury crash than drivers with a longer licensing period. First year drivers were six times more likely to be involved in a passenger hospitalisation and eight times more likely to be involved in a 'medical attention required' passenger injury than drivers with more than 12 months driving experience. Within each driver licensing group the proportion of passengers with each injury severity was similar ( $\chi^2 = 7.73$ ,  $p > 0.05$ )

**Table 2 The severity of passenger injuries by the time since the driver was licensed, WA 1997-2000**

Injury severity	Time since licensing						Total	Rate ratio	
	12 months or less			More than 12 months					
	n	%	Rate*	n	%	Rate*			
Fatal	31	7.1	2.6	121	6.1	0.3	152	6.3	8.6
Hospitalised	334	76.6	4.7	1475	74.0	0.8	1809	74.4	5.9
Medical attention	55	12.6	28.5	331	16.6	3.5	386	15.9	8.1
Injured no treatment**	15	3.4	1.3	58	2.9	0.1	73	3.0	13.0
Unknown	1	0.2	n/a	9	0.5	n/a	10	0.4	n/a
Total	436	100.0		1994	100.0		2430	100.0	

\* per 10,000 licensed drivers.

\*\* these were in a crash in which another passenger was fatally or seriously injured

n/a = rate not calculated because the number of injured passengers was too small.

$\chi^2 = 7.73$ ,  $p > 0.05$  (n/s)

The passenger injury rates per 10,000 licensed drivers for 17 and 18 year old first year drivers by sex are given in Table 3. Passengers were 1.4 times more likely to be injured with a 17 year old male driver than with a female driver of similar age. Eighteen year old male drivers had almost two times the passenger injury rate of 18 year old female drivers. Eighteen year old male drivers had a slightly higher rate than 17 year old drivers (rate ratio

1.1). The opposite was shown for female drivers where passengers with a 17 year old driver were 1.3 times more likely to be injured than those with an 18 year old female first year driver.

**Table 3 Four-year average passenger injury rate per 10,000 licensed drivers and the male/female rate ratio, WA 1997–2000**

Driver age	Driver sex		Female		
	Male		Average n*	Rate‡	Rate ratio
17	166	228.9	96	158.6	1.4
18	73	243.1	44	125.0	1.9
19	12	n/a	14	n/a	n/a
20	7	n/a	2	n/a	n/a
21	9	n/a	4	n/a	n/a
22	3	n/a	6	n/a	n/a
23	8	n/a	5	n/a	n/a
24	1	n/a	2	n/a	n/a
25	3	n/a	0	n/a	n/a

\*Average number of passengers injured

‡Rate per 10,000 licensed drivers

n/a = rate not calculated because the number of injured passengers was too small

Within each licensing group, the passenger injury rates were lower for females than males except for passengers in the 'needed medical attention' group for drivers with more than 12 months experience (Table 4). Male drivers were approximately twice as likely as female drivers to be involved in a fatal injury. Male drivers with 12 months experience or less were about nine times more likely to be involved in a fatal passenger injury than male drivers licensed for more than 12 months. Less experienced female drivers were 11.7 times more likely than more experienced female drivers to be involved in a fatal passenger crash.

**Table 4 Passenger injury rate per 10,000 licensed drivers by injury severity, time since driver licensing and driver sex, WA 1997–2000**

Injury severity	Time since licensing							
	Less than 12 months				More than 12 months			
	Rate*		Rate ratio	Rate*		Rate ratio	Rate ratio	Rate ratio
	Male	Female		Male	Female		M:M	F:F
Fatal	13.9	7.0	2.0	1.6	0.6	2.7	8.7	11.7
Hospitalised	137.3	88.8	1.5	17.5	9.2	1.9	7.8	9.6
Medical attention	21.1	16.2	1.3	3.0	3.2	0.9	7.0	5.1
No treatment	n/a	n/a	n/a	0.7	0.4	n/a	n/a	n/a
Unknown	n/a	n/a	n/a	0.1	0.1	n/a	n/a	n/a
Total		n/a		22.8	13.6			

\* Rate per 10,000 licensed drivers

n/a = rate unable to be calculated because the number of injured passengers was too small.

Sixty-three per cent of passengers were wearing a seat belt at the time of the crash, 15% were not, 0.2% of seat belts failed, and for 24% seat belt status was unknown. The percent of passengers wearing a seat belt was similar for both groups of driver licensing; 61% for passengers of drivers licensed for 12 months or less and 62% for drivers licensed for longer. There was a difference in seat belt wearing by passenger age. Passengers younger than 16 or older than 35 years were more likely to wear a seat belt than the 17-34 year olds.

#### 4. DISCUSSION

The results of this study are similar to other studies. The higher injury risk for passengers travelling with a recently licensed driver was similar to that seen in other studies before passenger restrictions were introduced. The proportions shown in this study were similar to those found in studies in the US and New Zealand before the introduction of restrictions on carrying passengers.

Several solutions have been tried in other countries, such as restrictions on carrying passengers. This resulted in reductions of 7–42% in road user deaths. Restrictions on carrying passengers have been effective but unpopular, and can be difficult to enforce without other legislation such as the compulsory carriage of driver's licence to back up the enforcing officer. In Norway a campaign called the 'Speak-out' campaign was developed [20]. This road safety campaign was targetted at teenage passengers and encouraged them to speak out to drivers about unsafe driving. This campaign is credited for a 30% reduction in car passenger fatalities.

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### **Keywords**

Passengers, probationary drivers, road safety