MONASH University
Accident Research Centre

BICYCLE AND MOTOR VEHICLE CRASH CHARACTERISTICS

by

Linda Watson
Max Cameron

Report No. 251
September 2006

Project Sponsored By

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE
REPORT DOCUMENTATION PAGE

Report No.	Report Date	ISBN	Pages
251	September 2006	0 7326 2321 9	30 + Appendices

Title and sub-title:
Bicycle and motor vehicle crash characteristics

Author(s)
Watson, L.M.& Cameron, M.H.

Type of Report & Period Covered
Summary Report, 2000-2004

Sponsoring Organisations - This project was funded as contract research by the following organisation:
Amy Gillett Foundation

Abstract:
This report describes the characteristics of crashes involving bicycles and motor vehicles and was based on data on police reported crashes in Victoria, Queensland, Western Australia and South Australia during 2000-2004.

Crashes involving 13,901 bicycle riders were matched to colliding motor vehicles and their drivers. These collisions were used to describe characteristics of bicycle crash circumstances, demographics and serious injury outcomes of both bicycle riders and motorists involved.

Results of the research has been valuable in providing insight into understanding bicycle and motor vehicle collisions resulting in injury to the bicycle rider. Directions for further research have been suggested.

Key Words: (IRRD except when marked*)
Accident, Bicycle, Bicycle Rider, Cyclist, Collision, Crash, Injury, Motorcyclist, Motor Vehicle, Motorist, Pedestrian, Road User, Vehicle, Chart

Monash University Accident Research Centre Building 70, Monash University Victoria 3800, Australia. Telephone: +61 3 9905 4371, Fax: +61 3 9905 4363

EXECUTIVE SUMMARY

This study is an exploratory one to characterise bicycle and motor vehicle crashes. It is based on real crashes reported to police from Victoria, Queensland, South Australia and Western Australia during 2000-2004.

Crashes involving bicycle riders were identified and 13,901 bicycle riders matched to colliding motor vehicles and their drivers. These collisions were used to describe characteristics of bicycle crash circumstances, demographics and serious injury outcomes of both bicycle riders and motorists involved.

Crashes of vehicles from adjacent directions at intersections predominate along with events involving manoeuvres of either vehicle such as u-turns and entering or leaving parking. The crash occurred on the straight for 91.7% of crashes and 98.6% of crashes occurred on sealed roads.

Monday to Friday were the most common days for crashes to occur, with crashes being least frequent on Saturdays and Sundays. Crashes were more likely to occur in the time periods 2pm to 6pm and 6am to 10am than any other time of the day with crash frequencies highest from 2pm to 6pm. Crashes were more common in February and March with a decline apparent during the winter months.

Overall 80% of crashes involved male bicycle riders. Bicycle riders aged 6 to 19 years were involved in crashes the most followed by bicyclists aged 20 to 29 years. Crash involvement for these age groups was 29.2% and 20.1% respectively. Overall 54% of crashes involved male motorists and 36.5% of crashes involved female motorists. Motorists aged 30 to 39 years were involved in crashes the most followed by motorists aged 40 to 49 years and 20 to 25 years. Crash involvement for these age groups was 18.1%, 14.5% and 13.5% respectively.

In general, crashes involving bicycle riders are seldom reported to the Police unless someone is killed or injured (usually the bicyclist) hence only injury crashes are considered in this report. Serious injury is defined as an injury requiring admission to hospital or death. The rate of bicycle riders killed or seriously injured has remained relatively constant over the period 2000 to 2004 and the average risk of death or serious injury for bicycle riders involved in the reportable crashes used in this study is around 27%. Injury severity remains relatively static for 20 to 49 year old bicycle riders with the risk of serious injury for those aged under 20 increasing inversely with age. Similarly the risk of serious injury increases with age for 50 year olds and above.

In summary, results of the research has been valuable in providing insight into understanding bicycle and motor vehicle collisions resulting in injury to the bicycle rider. Directions for further research have also been suggested.

.

CONTENTS

APPENDICES

BICYCLE AND MOTOR VEHICLE CRASHES

Victorian, Queensland, Western Australian and South Australian crashes occurring during 2000-2004

1. INTRODUCTION

1.1 Background

Bicycle riders together with pedestrians and motorcyclists are among the most vulnerable road users.

Previous research (Newstead et al, 20004b) on unprotected road users found the average risk of death or serious injury for unprotected road users involved in reportable crashes is around 35%. For drivers of light vehicles, the highest average risk of death or serious injury in a reported crash is around 12% in single vehicle crashes or about one third the risk of an unprotected road user. This compares with an average serious injury risk of only 2.3% for light vehicle drivers in crashes with other light vehicles, only one fifteenth the risk of an unprotected road user. Interpreting this in a total serious road trauma context shows the relative importance of reducing crashes involving unprotected road users compared to crashes involving light vehicle drivers.

The Amy Gillett Foundation has been established to promote a safe and harmonious relationship between cyclists and motorists. To facilitate this aim an exploratory study has been undertaken to characterise crashes between bicycle riders and motorists.

1.2 Project Motivation and Aims

In order for the Amy Gillett Foundation to inform its marketing and awareness strategy data from bicyclist and motorist incidents for the period 2000 to 2004 was gathered to characterise crashes. Of particular interest are:

- Age and gender of each cyclist and motorist involved in an incident
- Weather conditions at the time of the accident
- Time of day and month of the accident
- Location
- Level of injury
- Cause of incident

With this information a better understanding of bicycle crash characteristics was obtained, including age/gender groups for both cyclists and motorists involved in incidents, times of the day/year crashes occur, and weather conditions.

The Foundation's Marketing Advisory Group will use this information to develop effective and targeted key messages and awareness campaigns.

2. CRASH DATA

Data from Victoria, Queensland, South Australia and Western Australia covering police reported crashes during the years 2000-2004 was used in this project. In general, crashes involving unprotected road users such as pedestrians, bicyclists and motorcyclists are seldom reported to the Police unless someone is killed or injured (usually the unprotected road user) hence only serious injury risk is considered in this report. It was not possible to use the 2000 to 2004 records from New South Wales crash data because as a result of coding changes a reliable measure of injury severity was not available for the years 1999 onwards. In addition, a subset of the data including vehicle market group, used to produce the crashworthiness and aggressivity ratings of Newstead et al (2006) was used. The method of selecting appropriate cases from the data source is briefly detailed here.

2.1 Collisions Involving Bicycles

Bicycle riders injured in a collision were identified in each of Victoria, Queensland, South Australia and Western Australia using variables identifying unit type or road user type. The combined data reported in Table 1 shows a total of 15,685 bicyclists were involved in police reported crashes of all crash types in Victoria, Queensland, South Australia and Western Australia during each of the years 2000-2004. These bicycle crashes are displayed graphically in Figure 1.

In order to obtain the subset of the crash data where a bicycle rider was involved in a collision with a motor vehicle a matching process was required to identify impacting units. Impacting units once identified, were then categorised into one of four types. Four categories were used, being bicycle collisions involving motor vehicles, motorcycles, pedestrians and other.

Bicycle riders, pedestrians, motor vehicles and motorcyclists are all coded as units in each of the states. In addition some states code objects involved in collisions, such as trees or posts as units. It is these matched units that fall into the category other. This category, if combined with bicycle records that were unable to be matched in the matching process would provide a full description of all other bicycle crash types. These crash types are not described further in this report.

Table 1: *Numbers of bicyclists injured in crashes in Victoria, Queensland, South Australia and Western Australia during each of the years 2000-2004.*

	Year of crash										Total	
	2000		2001		2002		2003		2004			
	N	%	N	%	N	%	N	%	N	%	N	%
State												
Victoria	1,043	19.10	1,001	18.33	1,155	21.15	1,048	19.19	1,215	22.24	5,462	100.00
Queensland	845	19.15	984	22.30	906	20.53	802	18.17	876	19.85	4,413	100.00
Western Australia	579	18.87	635	20.70	608	19.82	594	19.36	652	21.25	3,068	100.00
South Australia	575	20.97	590	21.52	597	21.77	513	18.71	467	17.03	2,742	100.00
Total	3,042	19.39	3,210	20.47	3,266	20.82	2,957	18.85	3,210	20.47	15,685	100.00

Figure 1: *Number of bicyclists involved in crashes by state and year of crash*

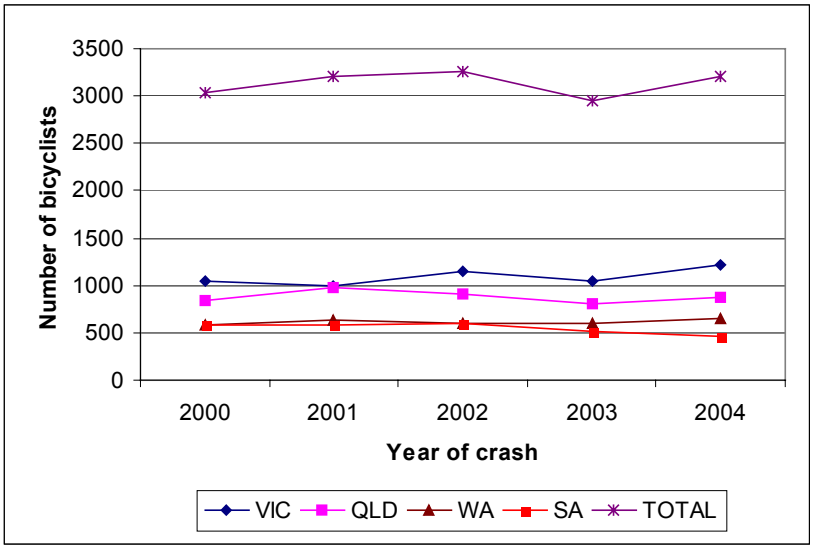


Table 2 describes the breakdown by crash type of the 14,980 bicycle riders matched to colliding units. Of interest for this report is the 13,901 bicycle riders matched to motor vehicles and it is this data that is described in the remaining sections of this report. Additional tables, some particular to each state are included in Appendices 1 to 4. Appendices 5 and 6 provide a basic insight into bicycle collisions with pedestrians and motorcycle riders respectively.

Table 2: *Collision partner by state*

	Colliding unit								Total	
	Pedestrian		Motorcycle		Motor vehicle		Other			
	N	%	N	%	N	%	N	%	N	%
State										
Victoria	93	1.78	35	0.67	4,832	92.73	251	4.82	5,211	100.00
Queensland	54	1.29	50	1.19	3,759	89.82	322	7.69	4,185	100.00
Western Australia	35	1.21	14	0.48	2,837	98.27	1	0.03	2,887	100.00
South Australia	93	3.45	15	0.56	2,473	91.69	116	4.30	2,697	100.00
Total	275	1.84	114	0.76	13,901	92.80	690	4.61	14,980	100.00

2.2 Collisions Involving Bicycles and motor vehicles

The distribution of the 13,901 crashes between bicycle riders and motor vehicles by state and year of crash is described in Table 3.

Table 3: *Crashes between bicyclists and motorists by state*

	Year of crash										Total	
	2000		2001		2002		2003		2004			
	N	%	N	%	N	%	N	%	N	%	N	%
State Victoria	932	19.29	878	18.17	1,016	21.03	926	19.16	1,080	22.35	4,832	100.00
Queensland	732	19.47	846	22.51	759	20.19	682	18.14	740	19.69	3,759	100.00
Western Australia	524	18.47	581	20.48	575	20.27	556	19.60	601	21.18	2,837	100.00
South Australia	508	20.54	542	21.92	555	22.44	457	18.48	411	16.62	2,473	100.00
Total	2,696	19.39	2,847	20.48	2,905	20.90	2,621	18.85	2,832	20.37	13,901	100.00

3. BICYCLE CRASH CHARACTERISTICS

3.1 Temporal characteristics

The days of the week and the months when crashes occurred are summarised in Tables 4 and 6 respectively and described graphically in Figures 2 and 4. The times of the day when crashes occurred are summarised in Table 5 and described graphically in Figure 3.

3.1.1 Week day of crash

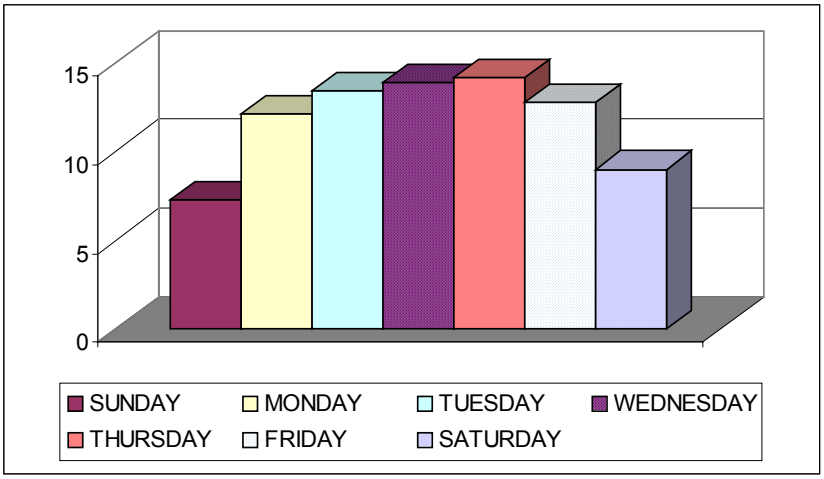
Monday to Friday were the most common days for crashes to occur, with crashes being least frequent on Saturdays and Sundays.

Table 4: *Week day of crash*

	N	%
Day of Week Unknown*	2,473	17.79
Sunday	986	7.09
Monday	1,668	12.00
Tuesday	1,909	13.73
Wednesday	1,933	13.91
Thursday	1,959	14.09
Friday	1,761	12.67
Saturday	1,212	8.72
Total	13,901	100.00

*Day of week unknown for South Australia

Figure 2: *Percentage of bicycle crashes by day of week*



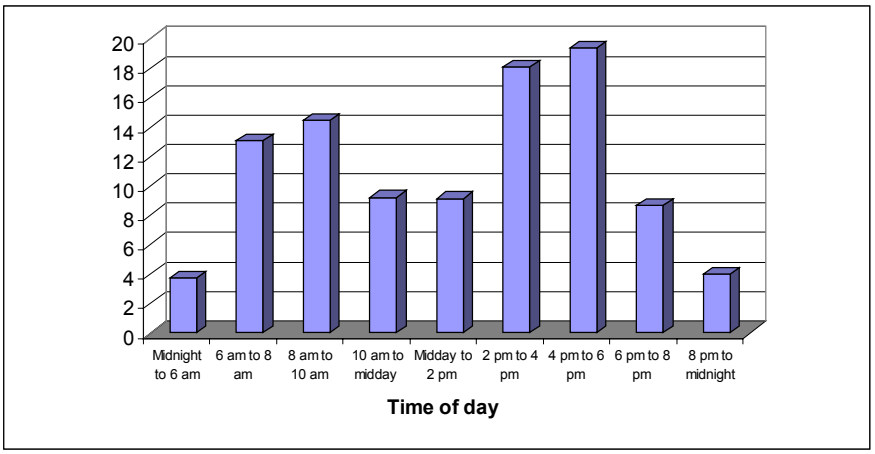
3.1.2 Time of crash

Crashes were more likely to occur in the time periods 2pm to 6pm and 6am to 10am than any other time of the day with crash frequencies highest from 2pm to 6pm. Table 5 shows crash frequencies by time of day in detail and Figure 3 displays this information graphically.

Table 5: *Time of crash*

	N	%
Time of crash Unknown	28	0.20
Midnight to 6 am	474	3.41
6 am to 8 am	1,818	13.08
8 am to 10 am	2,019	14.52
10 am to midday	1,264	9.09
Midday to 2 pm	1,270	9.14
2 pm to 4 pm	2,551	18.35
4 pm to 6 pm	2,773	19.95
6 pm to 8 pm	1,202	8.65
8 pm to midnight	502	3.61
Total	13,901	100.00

Figure 3: *Percentage of bicycle crashes by time of day*



3.1.3 Month of crash

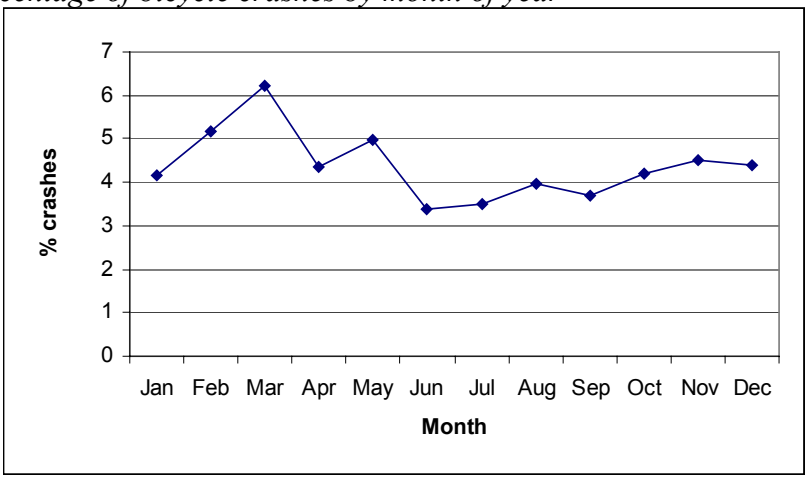
Table 6 shows the frequency of crash occurrence by month for states Victoria and South Australia and Figure 4 displays this graphically. Crashes were more common in February and March with a decline apparent during the winter months.

Table 6: *Month of crash*

	N	%
Month of crash	6,596	47.45
Unknown *		
January	579	4.17
February	718	5.17
March	864	6.22
April	604	4.35
May	693	4.99
June	473	3.40
July	488	3.51
August	550	3.96
September	516	3.71
October	582	4.19
November	628	4.52
December	610	4.39
Total	13,901	100.00

* Queensland and Western Australia unknown

Figure 4: *Percentage of bicycle crashes by month of year*



3.2 Motor vehicle characteristics

3.2.1 Motor vehicle market group categories

In the most recent update of the vehicle safety ratings (Newstead et al, 2006) rated vehicles were classified into one of 13 market group classifications, comprising 8 classes of regular passenger car, 3 classes of four wheel drive (4WD) vehicle (also known as Sports Utility Vehicles) and 2 classes of light commercial vehicle. The market groups defined are based heavily on those used by the Federal Chamber of Automotive Industries (FCAI) for reporting Australian vehicle sales as part of their VFACTS publication (see www.fcai.com.au for further details). The 12 market groups were defined as follows.

Passenger Cars

Light	Passenger car, hatch or sedan 3 or 4 cylinder engine, up to 1,500 cc.
Small	Passenger car, hatch, sedan or wagon, 4 cylinder engine, 1,501 cc - 1,900 cc.
Medium	Passenger car, hatch, sedan or wagon, 4 cylinder engine, 1,901 cc upward.
Large	Passenger car, hatch, sedan or wagon, 6 or 8 cylinder engine.
People Movers	Passenger usage seating capacity > 5 people.
Sports	Coupe or convertible
Luxury	Highly specified passenger cars, coupe, convertible, hatch, sedan or wagon.

Four Wheel Drive Vehicles (high ground clearance, off road wagon)

4WD Compact	Index rating < 550 (typically less than 1700kg tare mass)
4WD Medium	Index rating 550 < 700 (typically between 1700kg and 2000kg tare mass)
4WD Large	Index rating > 700 (typically greater than 2000kg tare mass)

Light Commercial Vehicles

Van	Blind & window vans.
Utility	Two and four wheel drive, normal control (bonnet), utility, cab chassis and crew-cabs.

The classification of 4WD vehicles is based on an index developed by VFACTS that considers gross vehicle mass, maximum engine torque and the availability of a dual range transmission. The index typically classifies the vehicles roughly by tare mass as indicated on the classifications above. Some departures from the VFACTS classification have been made in presenting the ratings in this study. VFACTS defines a luxury 4WD category based on vehicle price as well as classifying sports cars priced above the luxury car tax threshold as luxury vehicles. Here, the luxury 4WDs have been distributed amongst the 3 defined 4WD categories based on tare mass, as the information for computing the classification index used by VFACTS was not available at the time of the study. All sports cars have been classified as such, regardless of price.

There have also been some departures from the classification principles defined above for certain vehicle models that have a range of engine sizes and hence fall across two different defined categories. These are typically passenger vehicles and include, for example, cars like the Toyota Camry that come fitted with a large 4 cylinder engine in some variants and a 6 cylinder engine in other variants. In these cases, a value judgement has been made for each vehicle model individually based on the other vehicle models with which each typically competes in the market place.

Table 7 summarises the distribution of bicycle crashes by vehicle market group for vehicles where this information is available. Further research on exposure is required to identify if any market group is over or under represented and thus poses a greater or lesser risk of collision with a bicycle rider.

Table 7: *Colliding motor vehicle market group by state*

	State						Total	
	Victoria		Queensland		Western Australia			
	N	%	N	%	N	%	N	%
Vehicle market group								
Unknown	2,108	43.63	1,438	38.25	1,107	39.02	4,653	40.72
Four Wheel Drive - Compact	73	1.51	42	1.12	42	1.48	157	1.37
Four Wheel Drive - Large	84	1.74	50	1.33	91	3.21	225	1.97
Four Wheel Drive - Medium	70	1.45	18	0.48	39	1.37	127	1.11
Commercial - Ute	160	3.31	244	6.49	118	4.16	522	4.57
Commercial - Van	65	1.35	60	1.60	31	1.09	156	1.37
Large	1,056	21.85	878	23.36	551	19.42	2,485	21.74
Luxury	212	4.39	120	3.19	90	3.17	422	3.69
Medium	207	4.28	173	4.60	133	4.69	513	4.49
People Mover	47	0.97	48	1.28	28	0.99	123	1.08
Small	469	9.71	400	10.64	340	11.98	1,209	10.58
Light	208	4.30	248	6.60	237	8.35	693	6.06
Sport	73	1.51	40	1.06	30	1.06	143	1.25
Total	4,832	100.00	3,759	100.00	2,837	100.00	11,428	100.00

3.3 Road user movement characteristics

Table 8 describes the collision types with respect to the general movement of the bicycle and vehicle involved in the initial event. Crashes of vehicles from adjacent directions at intersections predominate along with events involving manoeuvres of either vehicle such as u-turns and entering or leaving parking.

For more detailed definitions for classifying accidents (DCAs) refer to Tables A1.16 and A1.17 in Appendix 1 for Victoria and Tables A2.10 in Appendix 2 for Queensland. Table A3.16 in Appendix 3 has more detailed road user movements (RUMs) for Western Australia.

South Australian crash data does not include DCAs or RUMs so is excluded from this grouped summary. However South Australian crash data does include information on accident type (Table A4.4 in Appendix 4) which provides some information on road user movements.

Table 8: *Grouped road user movements and definitions for classifying accidents by state*

	N	%
Grouped Definition for classifying accidents		
Unknown	57	0.50
Pedestrian (on foot or in toy/pram)	9	0.08
Vehicles from adjacent directions (intersections only)	3,302	28.89
Vehicles from opposing directions	1,367	11.96
Vehicles from same direction	2,390	20.91
Manoeuvring	3,195	27.96
Overtaking	95	0.83
On path	719	6.29
Off path on straight	246	2.15
Off path on curve	10	0.09
Passenger and miscellaneous	38	0.33
Total	11,428	100.00

Excludes South Australia

3.4 Location characteristics

3.4.1 Horizontal road alignment

The crash occurred on the straight for 91.7% of crashes. Table 9 shows horizontal road alignment by state.

Table 9: *Horizontal road alignment by state*

	Road horizontal alignment						Total	
	Unknown		Straight		Curve			
	N	%	N	%	N	%	N	%
State Victoria	.	.	4,768	98.68	64	1.32	4,832	100.00
Queensland	.	.	3,354	89.23	405	10.77	3,759	100.00
Western Australia	176	6.20	2,276	80.23	385	13.57	2,837	100.00
South Australia	4	0.16	2,345	94.82	124	5.01	2,473	100.00
Total	180	1.29	12,743	91.67	978	7.04	13,901	100.00

3.4.2 Vertical road alignment

Table 10: *Vertical road alignment by state*

	Road vertical alignment										Total	
	Unknown		Level		Grade		Crest		Dip			
	N	%	N	%	N	%	N	%	N	%	N	%
State Queensland	.	.	2,992	79.60	608	16.17	63	1.68	96	2.55	3,759	100.00
Western Australia	112	3.95	2,067	72.86	588	20.73	70	2.47	.	.	2,837	100.00
South Australia	5	0.20	2,212	89.45	198	8.01	20	0.81	38	1.54	2,473	100.00
Total	117	1.29	7,271	80.17	1,394	15.37	153	1.69	134	1.48	9,069	100.00

Excludes Victoria

3.4.3 Light conditions

Table 11: *Light conditions by state*

	Light conditions								Total	
	Unknown		Daylight		Dawn/Dusk		Darkness			
	N	%	N	%	N	%	N	%	N	%
State Victoria	23	0.48	3,748	77.57	487	10.08	574	11.88	4,832	100.00
Queensland	12	0.32	3,120	83.00	228	6.07	399	10.61	3,759	100.00
Western Australia	42	1.48	2,404	84.74	138	4.86	253	8.92	2,837	100.00
South Australia	.	.	2,102	85.00	95	3.84	276	11.16	2,473	100.00
Total	77	0.55	11,374	81.82	948	6.82	1,502	10.80	13,901	100.00

3.4.4 Road surface

Table 12: *Road surface by state*

	Road surface						Total	
	Unknown		Sealed		Unsealed			
	N	%	N	%	N	%	N	%
State Queensland	11	0.29	3,742	99.55	6	0.16	3,759	100.00
Western Australia	75	2.64	2,741	96.62	21	0.74	2,837	100.00
South Australia	1	0.04	2,462	99.56	10	0.40	2,473	100.00
Total	87	0.96	8,945	98.63	37	0.41	9,069	100.00

Excludes Victoria

3.4.5 Road condition

Table 13: *Road condition by state*

	Road condition						Total	
	Unknown		Wet		Dry			
	N	%	N	%	N	%	N	%
State Victoria	73	1.51	378	7.82	4,381	90.67	4,832	100.00
Queensland	11	0.29	230	6.12	3,518	93.59	3,759	100.00
Western Australia	71	2.50	226	7.97	2,540	89.53	2,837	100.00
South Australia	.	.	153	6.19	2,320	93.81	2,473	100.00
Total	155	1.12	987	7.10	12,759	91.78	13,901	100.00

3.4.6 Speed zone

Table 14: *Speed zone*

	N	%
Speed zone Unknown	981	7.06
75 Km/H and under	12,096	87.02
76 Km/H and over	824	5.93
Total	13,901	100.00

4. BICYCLE RIDER CHARACTERISTICS

4.1 Bicycle rider demographics

4.1.1 Sex

Overall 80% of crashes involved male bicycle riders. Table 15 details the sex and state origin of the involved bicycle riders.

Table 15: *Bicycle rider sex by state*

	Sex						Total	
	Unknown		Female		Male			
	N	%	N	%	N	%	N	%
State Victoria	33	0.68	1,014	20.99	3,785	78.33	4,832	100.00
Queensland	12	0.32	652	17.35	3,095	82.34	3,759	100.00
Western Australia	177	6.24	454	16.00	2,206	77.76	2,837	100.00
South Australia	47	1.90	398	16.09	2,028	82.01	2,473	100.00
Total	269	1.94	2,518	18.11	11,114	79.95	13,901	100.00

4.1.2 Age

The ages of bicycle riders involved in crashes are summarised in Table 16. Bicycle riders aged 6 to 19 years were involved in crashes the most followed by bicyclists aged 20 to 29 years. Crash involvement for these age groups was 29.2% and 20.1% respectively.

Table 16: *Bicycle rider age grouping by state*

	State								Total	
	Victoria		Queensland		Western Australia		South Australia			
	N	%	N	%	N	%	N	%	N	%
Age group Unknown	150	3.10	70	1.86	885	31.19	425	17.19	1,530	11.01
0-5 years	39	0.81	19	0.51	19	0.67	11	0.44	88	0.63
6-14 years	862	17.84	840	22.35	420	14.80	284	11.48	2,406	17.31
15-19 years	520	10.76	655	17.42	267	9.41	213	8.61	1,655	11.91
20-25 years	623	12.89	457	12.16	232	8.18	307	12.41	1,619	11.65
26-29 years	502	10.39	293	7.79	162	5.71	222	8.98	1,179	8.48
30-39 years	954	19.74	619	16.47	364	12.83	416	16.82	2,353	16.93
40-49 years	585	12.11	410	10.91	247	8.71	335	13.55	1,577	11.34
50-59 years	339	7.02	224	5.96	135	4.76	169	6.83	867	6.24
60+ years	258	5.34	172	4.58	106	3.74	91	3.68	627	4.51
Total	4,832	100.00	3,759	100.00	2,837	100.00	2,473	100.00	13,901	100.00

Table 17: *Bicycle rider age grouping by sex*

	Sex						Total	
	Unknown		Female		Male			
	N	%	N	%	N	%	N	%
Age group Unknown	245	16.01	183	11.96	1,102	72.03	1,530	100.00
0-5 years	.	.	20	22.73	68	77.27	88	100.00
6-14 years	4	0.17	425	17.66	1,977	82.17	2,406	100.00
15-19 years	6	0.36	214	12.93	1,435	86.71	1,655	100.00
20-25 years	.	.	463	28.60	1,156	71.40	1,619	100.00
26-29 years	2	0.17	303	25.70	874	74.13	1,179	100.00
30-39 years	4	0.17	476	20.23	1,873	79.60	2,353	100.00
40-49 years	1	0.06	224	14.20	1,352	85.73	1,577	100.00
50-59 years	3	0.35	139	16.03	725	83.62	867	100.00
60+ years	4	0.64	71	11.32	552	88.04	627	100.00
Total	269	1.94	2,518	18.11	11,114	79.95	13,901	100.00

4.2 Bicycle rider injury severity characteristics

In general, crashes involving bicycle riders are seldom reported to the Police unless someone is killed or injured (usually the bicyclist) hence only injury crashes are considered here. Serious injury is defined as an injury requiring admission to hospital or death. The severity outcome to bicycle riders are summarised in Tables 18 to 25 by a number of demographic and crash characteristics.

4.2.1 Injury severity by state

The average risk of death or serious injury for bicycle riders involved in the reportable crashes used in this study is around 27%. The South Australian rate of 13 % is considerably less and requires further investigation.

Table 18: *Bicycle rider injury severity by state*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
State						
Victoria	3,373	70.39	1,419	29.61	4,792	100.00
Queensland	2,457	67.26	1,196	32.74	3,653	100.00
Western Australia	1,466	75.41	478	24.59	1,944	100.00
South Australia	1,813	87.08	269	12.92	2,082	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

4.2.2 Injury severity by year of crash

Table 19 displays bicycle rider injury severity by year of crash. The rate of bicycle riders killed or seriously injured has remained relatively constant over the period 2000 to 2004.

Table 19: *Bicycle rider injury severity by year of crash*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Year of crash						
2000	1,830	75.84	583	24.16	2,413	100.00
2001	1,873	74.95	626	25.05	2,499	100.00
2002	1,825	70.27	772	29.73	2,597	100.00
2003	1,723	72.39	657	27.61	2,380	100.00
2004	1,858	71.96	724	28.04	2,582	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

4.2.3 Injury severity by sex

Table 20 details injury severity by bicycle rider sex.

Table 20: *Bicycle rider injury severity by sex*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Sex						
Unknown	58	90.63	6	9.38	64	100.00
Female	1,782	74.94	596	25.06	2,378	100.00
Male	7,269	72.48	2,760	27.52	10,029	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

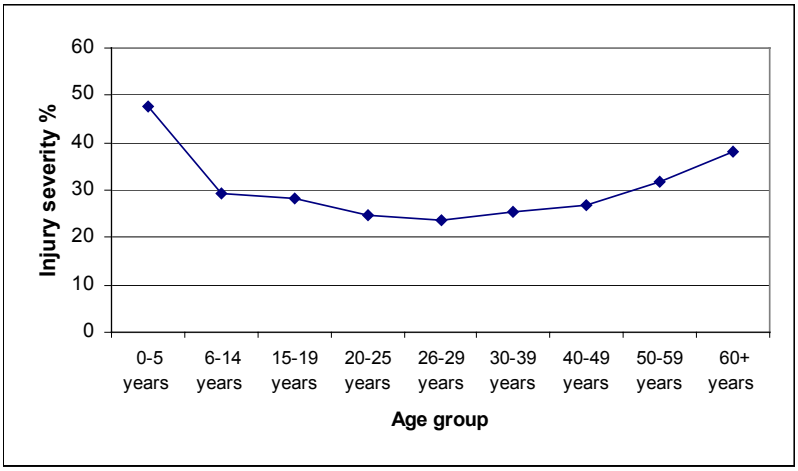
4.2.4 Injury severity by age

Injury severity remains relatively static for 20 to 49 year old bicycle riders with the risk of serious injury for those aged under 20 increasing inversely with age. Similarly the risk of serious injury increases with age for 50 year olds and above.

Table 21: *Bicycle rider injury severity by age grouping*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Age group Unknown	644	85.19	112	14.81	756	100.00
0-5 years	44	52.38	40	47.62	84	100.00
6-14 years	1,622	70.55	677	29.45	2,299	100.00
15-19 years	1,121	71.72	442	28.28	1,563	100.00
20-25 years	1,151	75.28	378	24.72	1,529	100.00
26-29 years	844	76.52	259	23.48	1,103	100.00
30-39 years	1,650	74.66	560	25.34	2,210	100.00
40-49 years	1,092	73.24	399	26.76	1,491	100.00
50-59 years	569	68.23	265	31.77	834	100.00
60+ years	372	61.79	230	38.21	602	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

Figure 5: *Injury severity by age group*

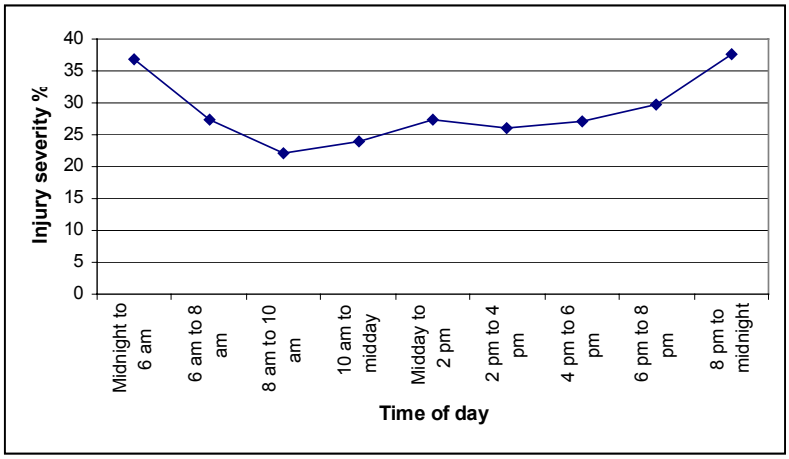


4.2.5 Injury severity by time of crash

Table 22: *Bicycle rider injury severity by time of crash*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Time Unknown	16	76.19	5	23.81	21	100.00
Midnight to 6 am	283	63.17	165	36.83	448	100.00
6 am to 8 am	1,204	72.53	456	27.47	1,660	100.00
8 am to 10 am	1,417	77.81	404	22.19	1,821	100.00
10 am to midday	853	75.96	270	24.04	1,123	100.00
Midday to 2 pm	807	72.51	306	27.49	1,113	100.00
2 pm to 4 pm	1,694	73.91	598	26.09	2,292	100.00
4 pm to 6 pm	1,786	72.90	664	27.10	2,450	100.00
6 pm to 8 pm	768	70.27	325	29.73	1,093	100.00
8 pm to midnight	281	62.44	169	37.56	450	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

Figure 6: *Injury severity by time of day*



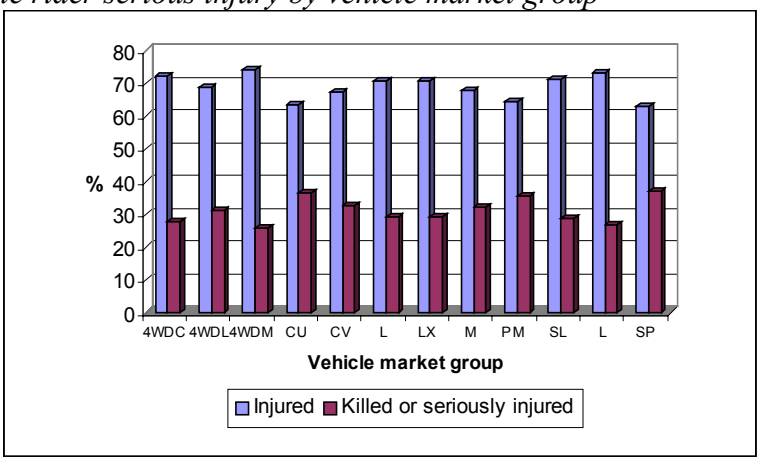
4.2.6 Injury severity by collision partner market group

Table 23 details injury severity outcome by impacting vehicle market group. This information is displayed graphically in Figure 7.

Table 23: *Bicycle rider injury severity by collision partner market group*

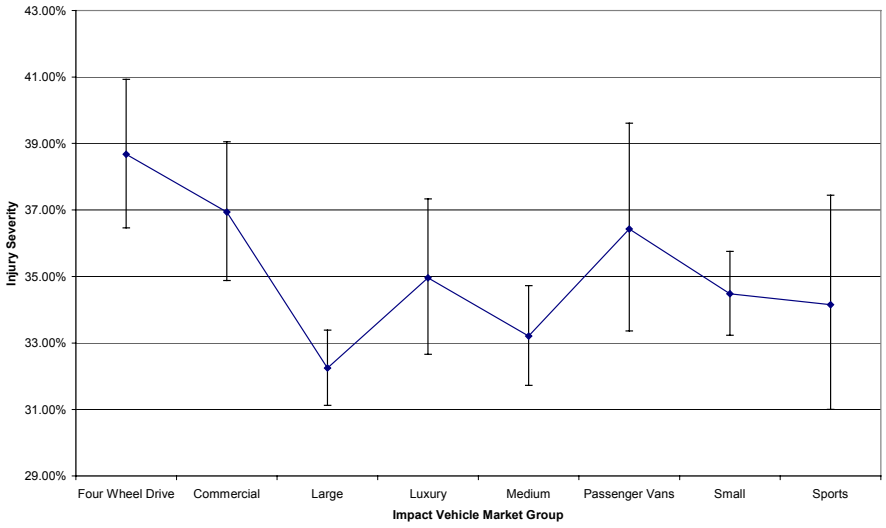
	Injury severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Vehicle market group						
Unknown	2,966	70.60	1,235	29.40	4,201	100.00
Four Wheel Drive – Compact (4WDC)	105	72.41	40	27.59	145	100.00
Four Wheel Drive - Large (4WDL)	138	68.66	63	31.34	201	100.00
Four Wheel Drive - Medium (4WDM)	84	74.34	29	25.66	113	100.00
Commercial - Ute (CU)	307	63.30	178	36.70	485	100.00
Commercial - Van (CV)	96	67.13	47	32.87	143	100.00
Large (L)	1,624	70.79	670	29.21	2,294	100.00
Luxury (LX)	276	70.77	114	29.23	390	100.00
Medium (M)	319	67.58	153	32.42	472	100.00
People Mover (PM)	73	64.60	40	35.40	113	100.00
Small (S)	779	71.27	314	28.73	1,093	100.00
Light (SL)	447	73.40	162	26.60	609	100.00
Sport (SP)	82	63.08	48	36.92	130	100.00
Total	7,296	70.23	3,093	29.77	10,389	100.00

Figure 7: *Bicycle rider serious injury by vehicle market group*



Previous research (Newstead et al, 20004b) on unprotected road users found the average risk of death or serious injury for unprotected road users involved in reportable crashes is around 35%. The unprotected road users were pedestrians, bicyclists and motorcyclists with pedestrians being the primary unprotected road user because the majority of unprotected road users involved in police reported crashes are pedestrians. The measure of aggressivity towards unprotected road users in this study was the risk of serious injury given some injury was sustained. Given this, the aggressivity measure used for unprotected road users is in effect an estimate of the risk of death or serious injury to an unprotected road user given involvement in a reportable crash. Aggressivity injury severity on unprotected road users by impact vehicle market group found in this study is shown in Figure 8 together with 95%confidence intervals.

Figure 8: *Aggressivity injury severity on unprotected road users by impact vehicle market group (with 95% confidence limits)*



The injury outcome for an unprotected road user as a result of a collision with a 4WD vehicle was estimated to be significantly more severe than the outcome of a collision with a vehicle from either the large, medium or small market groups. Similarly the unprotected road user injury outcome is significantly more severe as a result of a collision with a commercial vehicle than a vehicle from either the large or medium vehicle market groups.

The high aggressivity of 4WD vehicles towards unprotected road users has been identified in many studies now and is believed to be a result of the geometric properties of these vehicles. Such properties include high frontal structures combined with hard contact surfaces often featuring the presence of a bull bar (Attwell and Glase, 2000). Similar features can also be found on many commercial vehicles and passenger vans, also explaining the high aggressivity of these vehicle classes. It is unlikely that relative mass is a specific vehicle feature determining vehicle aggressivity in unprotected road user crashes given all vehicle classes are orders of magnitude heavier than the typical unprotected road user, of which pedestrians make up the majority.

Comparing the aggressivity of small, medium and large cars reveals a trend to decreasing aggressivity with increasing vehicle size. This is possibly a result of longer bonnet structures on larger cars meaning the unprotected road user is more likely to impact the softer bonnet area on these vehicles than hit the harder windscreen and a-pillar area of the car. This is particularly relevant for the vulnerable head region of the unprotected road user and is generally supported in a review by McLean (1996).

For drivers of light vehicles, the highest average risk of death or serious injury in a reported crash was around 12% in single vehicle crashes or about one third the risk of an unprotected road user. This compares with an average serious injury risk of only 2.3% for light vehicle drivers in crashes with other light vehicles, only one fifteenth the risk of an unprotected road user. Interpreting this in a total serious road trauma context shows the relative importance of reducing crashes involving unprotected road users compared to crashes involving light vehicle drivers.

Table 23 and Figure 7 show similar outcomes to this previous research for bicycle riders although the magnitude of market group differences appears to be smaller.

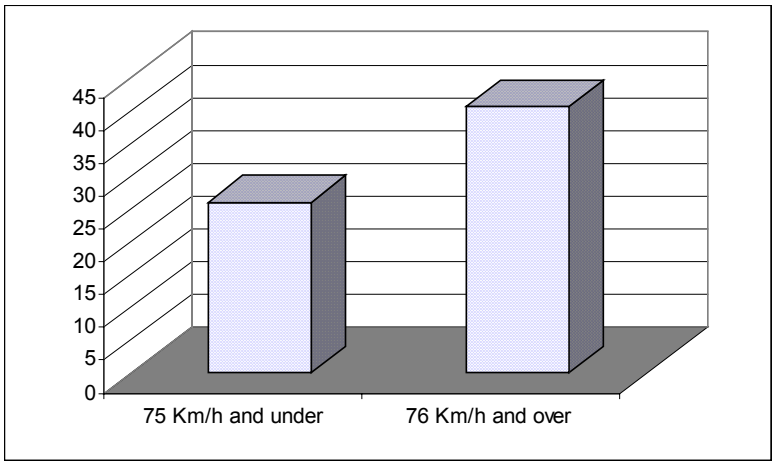
4.2.7 Injury severity by speed zone

Bicycle rider injury severity by speed zone is shown in Table 24 and displayed graphically in Figure 9.

Table 24: *Bicycle rider injury severity by speed zone*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Speed zone Unknown	485	74.96	162	25.04	647	100.00
75 Km/H and under	8,156	73.91	2,879	26.09	11,035	100.00
76 Km/H and over	468	59.32	321	40.68	789	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

Figure 9: *Bicycle rider injury severity by speed zone (%)*



4.2.8 Injury severity by group road user movement

Table 25: *Bicycle rider injury severity by grouped road user movements and definitions for classifying accidents*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Grouped road user movements and definition for classifying accidents						
Unknown	1,816	87.10	269	12.90	2,085	100.00
Pedestrian (on foot or in toy/pram)	3	60.00	2	40.00	5	100.00
Vehicles from adjacent directions (intersections only)	2,104	70.44	883	29.56	2,987	100.00
Vehicles from opposing directions	828	64.24	461	35.76	1,289	100.00
Vehicles from same direction	1,569	70.77	648	29.23	2,217	100.00
Manoeuvring	2,039	71.64	807	28.36	2,846	100.00
Overtaking	62	72.09	24	27.91	86	100.00
On path	506	72.70	190	27.30	696	100.00
Off path on straight	164	73.87	58	26.13	222	100.00
Off path on curve	2	25.00	6	75.00	8	100.00
Passenger and miscellaneous	16	53.33	14	46.67	30	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

5. COLLIDING MOTORIST CHARACTERISTICS

5.1 Colliding motorist demographics

5.1.1 Sex

Table 26 details sex by state for motorists colliding with bicycle riders. Overall 54% of crashes involved male motorists and 36.5% of crashes involved female motorists.

Table 26: *Motorist sex by state*

	Colliding unit sex						Total	
	Unknown		Female		Male			
	N	%	N	%	N	%	N	%
State								
Victoria	533	11.03	1,635	33.84	2,664	55.13	4,832	100.00
Queensland	309	8.22	1,388	36.92	2,062	54.86	3,759	100.00
Western Australia	243	8.57	1,175	41.42	1,419	50.02	2,837	100.00
South Australia	255	10.31	876	35.42	1,342	54.27	2,473	100.00
Total	1,340	9.64	5,074	36.50	7,487	53.86	13,901	100.00

5.1.2 Age

Table 27 shows motorists aged 30 to 39 years were involved in crashes the most followed by motorists in age groupings 40 to 49 years and 20 to 25 years. Crash involvement for these age groups was 18.1%, 14.5% and 13.5% respectively.

Table 27: *Motorist age grouping by state*

	State								Total	
	Victoria		Queensland		Western Australia		South Australia			
	N	%	N	%	N	%	N	%	N	%
Age group Unknown	582	12.04	445	11.84	589	20.76	596	24.10	2,212	15.91
0-5 years	.	.	.	.	51	1.80	.	.	51	0.37
6-14 years	.	.	1	0.03	290	10.22	.	.	291	2.09
15-19 years	225	4.66	216	5.75	398	14.03	140	5.66	979	7.04
20-25 years	623	12.89	469	12.48	526	18.54	261	10.55	1,879	13.52
26-29 years	386	7.99	307	8.17	449	15.83	145	5.86	1,287	9.26
30-39 years	1,034	21.40	736	19.58	339	11.95	402	16.26	2,511	18.06
40-49 years	820	16.97	653	17.37	121	4.27	419	16.94	2,013	14.48
50-59 years	603	12.48	492	13.09	74	2.61	311	12.58	1,480	10.65
60+ years	559	11.57	440	11.71	.	.	199	8.05	1,198	8.62
Total	4,832	100.00	3,759	100.00	2,837	100.00	2,473	100.00	13,901	100.00

5.2 Colliding motorist injury characteristics

5.2.1 Injury severity by state

Table 29: *Motorist injury severity by state*

	Injury Severity						Total	
	Unknown		Injured		Killed or seriously injured			
	N	%	N	%	N	%	N	%
State Victoria	4,762	98.55	57	1.18	13	0.27	4,832	100.00
Queensland	3,714	98.80	39	1.04	6	0.16	3,759	100.00
Western Australia	2,791	98.38	37	1.30	9	0.32	2,837	100.00
South Australia	2,458	99.39	15	0.61	.	.	2,473	100.00
Total	13,725	98.73	148	1.06	28	0.20	13,901	100.00

5.2.2 Motorists injury severity by bicyclist injury severity

Tables 30 and 31 detail motorist injury outcome when involved in a collision with a bicycle rider.

Table 30: *Motorist injury by bicyclist injury severity (all motorists)*

	Bicyclist injury severity				Total	
	Injured		Killed Or seriously injured			
	N	%	N	%	N	%
Motorist injury severity Not injured	9,034	73.25	3,299	26.75	12,333	100.00
Injured	71	61.21	45	38.79	116	100.00
Killed or seriously injured	4	18.18	18	81.82	22	100.00
Total	9,109	73.04	3,362	26.96	12,471	100.00

Table 31: *Motorist injury severity by bicyclist injury severity (injured motorists only)*

	Bicyclist injury severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Motorist injury severity Injured	71	61.21	45	38.79	116	100.00
Killed Or seriously injured	4	18.18	18	81.82	22	100.00
Total	75	54.35	63	45.65	138	100.00

6. DISCUSSION

6.1 Summary of characteristics of bicycle and motor vehicle collisions

There were 13,901 crashes involving bicycle riders and motor vehicles in the period 2000 to 2004. The crash data has been studied in a descriptive manner, focussing on investigation to identify those factors that may contribute to crash occurrence or injury severity. Further research is required to test whether the factors identified truly increase crash risk or are simply common characteristics of the bicycle rider, motorist, vehicles and locations involved and a reflection of exposure. This is an important step in developing countermeasures to address the problem. The crashes had the following characteristics:

6.1.1 Type of crash

Crashes of vehicles from adjacent directions at intersections predominate along with events involving manoeuvres of either vehicle such as u-turns and entering or leaving parking. The crash occurred on the straight for 91.7% of crashes and 98.6% of crashes occurred on sealed roads.

6.1.2 Temporal characteristics

Monday to Friday were the most common days for crashes to occur, with crashes being least frequent on Saturdays and Sundays. Crashes were more likely to occur in the time periods 2pm to 6pm and 6am to 10am than any other time of the day with crash frequencies highest from 2pm to 6pm. Crashes were more common in February and March with a decline apparent during the winter months.

6.1.3 Bicycle riders

Overall 80% of crashes involved male bicycle riders. Bicycle riders aged 6 to 19 years were involved in crashes the most followed by bicyclists aged 20 to 29 years. Crash involvement for these age groups was 29.2% and 20.1% respectively.

6.1.4 Bicycle riders seriously injured

In general, crashes involving bicycle riders are seldom reported to the Police unless someone is killed or injured (usually the bicyclist) hence only injury crashes are considered in this report. Serious injury is defined as an injury requiring admission to hospital or death. The rate of bicycle riders killed or seriously injured has remained relatively constant over the period 2000 to 2004 and the average risk of death or serious injury for bicycle riders involved in the reportable crashes used in this study is around 27%. Injury severity remained relatively static for 20 to 49 year old bicycle riders with the risk of serious injury for those aged under 20 increasing inversely with age. Similarly the risk of serious injury increases with age for 50 year olds and above.

6.1.5 Motorists

Overall 54% of crashes involved male motorists and 36.5% of crashes involved female motorists. Motorists aged 30 to 39 years were involved in crashes the most followed by motorists aged 40 to 49 years and 20 to 25 years. Crash involvement for these age groups was 18.1%, 14.5% and 13.5% respectively.

7. CONCLUSIONS

Results of research reported here have been able to describe characteristics of bicycle crash circumstances, demographics and serious injury outcomes of both bicycle riders and motorists involved and has also been valuable in providing insight into understanding bicycle and motor vehicle collisions resulting in injury to the bicycle rider. Directions for further research have also been suggested.

8. ASSUMPTIONS AND QUALIFICATIONS

The results and conclusions presented in this report are based on a number of assumptions and warrant a number of qualifications that the reader should note. These are as follows.

8.1 Assumptions

It has been assumed that:

- Victorian, Western Australian, Queensland and South Australian Police crash reports accurately recorded driver and bicycle rider injury, hospitalisation and death and that there was no bias in reporting injury at any level.

- Crashed vehicle registration numbers were recorded accurately on Police crash reports and that they correctly identified the crashed vehicles in the Victorian, NSW, Western Australian and Queensland vehicle registers. Further, it was also assumed that vehicle identification numbers and make and model details were accurately recorded in the vehicle registers.

- Information contained in the Police crash records allowed accurate matching of both vehicles involved in crashes between motor vehicles, pedestrians and motorcyclists with bicycle riders for the purpose of describing crashes.

9. REFERENCES

Attwell, R. and Glase, K. (2000). *Bull bars and road trauma.* Report Number CR200, Australian Transport Safety Bureau, Canberra, Australia.

Cameron, M.H., Newstead, S.V. & Le, C.M. (1998) 'Rating the aggressivity of Australian passenger vehicles towards other vehicle occupants and unprotected road users', *Proceedings, International IRCOBI Conference on the Biomechanics of Impact*, Gothenborg, Sweden.

McLean, A.J. (1996) *Pedestrian friendly vehicle front structures: A review of the literature.* Report Number CR166, Australian Transport Safety Bureau, Canberra, Australia.

Newstead, S., Cameron, M.H. Watson, L., & Delaney, A. (2003) *Vehicle Crashworthiness and Aggressivity Ratings and Crashworthiness by Year of Manufacture: Victoria and NSW Crashes During 1987-2000 Queensland and Western Australia Crashes During 1991-2000,* Report No. 196, Monash University Accident Research Centre, Melbourne, Australia.

Newstead, S., Cameron, M., and Watson, L. (2004a) *Vehicle Crashworthiness Ratings and Crashworthiness by Year of Manufacture: Victoria and NSW Crashes During 1987-2002 Queenslan, Western Australian and New ZealandCrashes During 1991-2002,* Report No. 222, Monash University Accident Research Centre, Melbourne, Australia.

Newstead, S., Watson, L., Delaney, A. and. Cameron, M. (2004b) *Crashwothiness and aggressivity of the Australian light vehicle fleet by major crash type,* Report No. 227, Monash University Accident Research Centre, Melbourne, Australia.

Newstead, S., Cameron, M.H. and Watson, L. (2005) *Vehicle Safety Ratings Estimated from Police Reported Crash Data: 2005 Update: Australian and New Zealand Crashes During 1987-2003,* Report No. 241, Monash University Accident Research Centre, Melbourne, Australia.

Newstead, S., Watson, L. and Cameron, M.H. (2006) *Vehicle Safety Ratings Estimated from Police Reported Crash Data: 2006 Update: Australian and New Zealand Crashes During 1987-2004,* Report No. 248, Monash University Accident Research Centre, Melbourne, Australia.

SAS Inc. (1989) *SAS STAT Users Guide, Version 6, Fourth Edition, Volume 2*. Carey, NC: SAS Institute.

APPENDIX 1

VICTORIAN BICYCLE AND MOTOR VEHICLE CRASH CHARACTERISTICS

ADDITIONAL TABLES

VICTORIAN CRASHES DURING 2000-2004

Temporal characteristics

Table A1.1: *Month of accident*

Month of accident	Frequency	Percent
January	399	8.26
February	489	10.12
March	552	11.42
April	382	7.91
May	467	9.66
June	325	6.73
July	305	6.31
August	352	7.28
September	339	7.02
October	388	8.03
November	415	8.59
December	419	8.67
Total	4832	100.00

Table A1.2: *Day of week*

Day of week	Frequency	Percent
Sunday	493	10.20
Monday	688	14.24
Tuesday	812	16.80
Wednesday	783	16.20
Thursday	815	16.87
Friday	716	14.82
Saturday	525	10.87
Total	4832	100.00

Table A1.3: *Time of day*

Time of day	Frequency	Percent
Unknown	5	0.10
Midnight to 6 am	71	1.47

Time of day	Frequency	Percent
6 am to 8 am	490	10.14
8 am to 10 am	836	17.30
10 am to midday	465	9.62
Midday to 2 pm	437	9.04
2 pm to 4 pm	707	14.63
4 pm to 6 pm	1004	20.78
6 pm to 8 pm	580	12.00
8 pm to midnight	237	4.90
Total	4832	100.00

Bicycle rider behaviour

Table A1.4: *Helmet use*

Helmet Use	Frequency	Percent
Seatbelt worn	1	0.02
Crash helmet worn	3284	67.96
Crash helmet not worn	631	13.06
Not appropriate	8	0.17
Unknown	908	18.79
Total	4832	100.00

Table A1.5: *Lamp usage*

Lamp usage	Frequency	Percent
Not applicable	2509	51.92
Yes	593	12.27
No	812	16.80
Unknown	918	19.00
Total	4832	100.00

Table A1.6: *Blood Alcohol Content*

Blood Alcohol Content	Frequency	Percent
Not tested / none	4816	99.67
0.000	1	0.02
0.001	6	0.12
0.041	1	0.02
0.058	1	0.02
0.068	1	0.02
0.069	1	0.02
0.092	1	0.02
0.104	1	0.02
0.116	1	0.02
0.163	1	0.02
0.235	1	0.02
Total	4832	100.00

Accident nature and site features

Table A1.7: *Accident type*

Accident type	Frequency	Percent
Collisn with veh	4673	96.71
Struck pedestrian	6	0.12
Collision fixed obj	11	0.23
Collision other obj	8	0.17
Vehicle overturn	3	0.06
Fall from/in moving veh	4	0.08
No col & no obj hit	127	2.63
Total	4832	100.00

Table A1.8: *Road type*

Road Type	Frequency	Percent
Unknown	28	0.58
Alley	1	0.02
Arcade	1	0.02
Avenue	182	3.77
Boulevard	16	0.33
Circle	1	0.02
Circuit	1	0.02
Close	4	0.08
Court	41	0.85
Crescent	44	0.91
Drive	121	2.50
Esplanade	1	0.02
Freeway	37	0.77
Freeway east	6	0.12
Freeway west	2	0.04
Gardens	1	0.02
Grove	14	0.29
Highway	585	12.11
Highway east	54	1.12
Highway west	43	0.89
Lane	17	0.35
Parade	66	1.37
Parade west	1	0.02
Place	24	0.50
Place east	1	0.02
Promenade	2	0.04
Rise	1	0.02
Road	1894	39.20
Road east	3	0.06

Road Type	Frequency	Percent
Road north	1	0.02
Road south	1	0.02
Road west	6	0.12
Square south	1	0.02
Street	1597	33.05
Street east	4	0.08
Street ext	1	0.02
Street north	3	0.06
Street south	1	0.02
Street west	2	0.04
Strip	1	0.02
Terrace	3	0.06
Toll way	2	0.04
Way	17	0.35
Total	4832	100.00

Table A1.9: *Road geometry*

Road geometry	Frequency	Percent
Cross intersection	1351	27.96
T-intersection	1453	30.07
Y-intersection	34	0.70
Multiple intersection	102	2.11
Not at intersection	1891	39.13
Unknown	1	0.02
Total	4832	100.00

Table A1.10: *Road character*

Controlling for road character=Straight			
Road character	Road character (N / % / Row % / Column %)		Total
		Driveway or crossover	
	2865 60.09 100.00 60.15	0 0.00 0.00 0.00	2865 60.09
Divided road	1859 38.99 99.73 39.03	5 0.10 0.27 100.00	1864 39.09
Median opening(not at interstn)	1 0.02 100.00 0.02	0 0.00 0.00 0.00	1 0.02
Driveway or crossover	38 0.80 100.00 0.80	0 0.00 0.00 0.00	38 0.80
Total	4763 99.90	5 0.10	4768 100.00

Controlling for Road character=Curve			
Road character	Road character (N / % / Row % / Column %)		Total
	.	Driveway or crossover	
.	56 87.50 100.00 87.50	0 0.00 0.00 .	56 87.50
Divided road	7 10.94 100.00 10.94	0 0.00 0.00 .	7 10.94
Median opening(not at interstn	0 0.00 . 0.00	0 0.00 . .	0 0.00
Driveway or crossover	1 1.56 100.00 1.56	0 0.00 0.00 .	1 1.56
Total	64 100.00	0 0.00	64 100.00

Table A1.11: *Road surface conditions*

Road surface conditions	Road surface conditions (N / % / Row % / Column %)		Total
		Wet	
Dry	4379 90.63 99.95 90.66	2 0.04 0.05 100.00	4381 90.67
Wet	378 7.82 100.00 7.83	0 0.00 0.00 0.00	378 7.82
Muddy	1 0.02 100.00 0.02	0 0.00 0.00 0.00	1 0.02
Unknown	72 1.49 100.00 1.49	0 0.00 0.00 0.00	72 1.49
Total	4830 99.96	2 0.04	4832 100.00

Table A1.12: *Traffic controls*

Traffic controls	Frequency	Percent
No control	3136	64.90
Stop-go lights	523	10.82
Flashing lights	2	0.04
Out of order	3	0.06
Pedestrian lights	24	0.50
Pedestrian crossing	38	0.79
Railway crossing gates & booms	4	0.08
Roundabout	350	7.24
Stop sign	192	3.97
Give way sign	398	8.24
School - no flags	4	0.08
Police	1	0.02
Other	22	0.46
Unknown	135	2.79

Traffic controls	Frequency	Percent
Total	4832	100.00

Table A1.13: *Number of vehicles involved*

Number of Vehicles Involved	Frequency	Percent
2	4492	92.96
3	294	6.08
4	27	0.56
5	4	0.08
6	5	0.10
7	10	0.21
Total	4832	100.00

Table A1.14: *Speed zone at accident site*

Speed zone at accident site	Frequency	Percent
40 km/hh	40	0.83
50 km/hr	1074	22.23
60 km/hr	2957	61.20
70 km/hr	286	5.92
80 km/hr	266	5.50
90 km/hr	8	0.17
100 km/hr	132	2.73
110 km/hr	6	0.12
Other speed limit	2	0.04
Camping ground/off rd	1	0.02
Not known	60	1.24
Total	4832	100.00

Table A1.15: *Hit run accident*

Hit run accident	Frequency	Percent
No	4337	89.76
Yes	495	10.24

Hit run accident	Frequency	Percent
Total	4832	100.00

Table A1.16: *Definition for classifying accidents*

Definition for classifying accidents	Frequency	Percent
Ped near side. Ped hit by vehicle from the right	1	0.02
Veh strikes ped on footpath,median,traffic island	2	0.04
Ped struck walking to/from or boarding/alighting vehicle	1	0.02
Cross traffic(intersections only)	509	10.62
Right far (intersections only)	52	1.09
Left far (intersections only)	31	0.65
Right near (intersections only)	284	5.93
Two right turning (intersections only)	15	0.31
Right/left far (intersections only)	12	0.25
Left near (intersections only)	186	3.88
Left/right far (intersections only)	1	0.02
Two left turning (intersections only)	1	0.02
Other adjacent (intersections only)	20	0.42
Head on (not overtaking)	86	1.79
Right through	549	11.46
Left through	8	0.17
Right/left. One veh turning right the other left	6	0.13
Right/right. Both vehs from opposite directions turning right	4	0.08
Other opposing manoeuvres not included in dcas 120-125	7	0.15
Rear end(vehicles in same lane)	227	4.74
Left rear	27	0.56
Right rear	32	0.67
Lane side swipe (vehicles in parallel lanes)	240	5.01
Lane change right (not overtaking)	120	2.50
Lane change left (not overtaking)	113	2.36
Right turn sideswipe	68	1.42

Definition for classifying accidents	Frequency	Percent
Left turn sideswipe	214	4.47
Other same direction-manouevres not included in dcas 130-137	21	0.44
U turn	60	1.25
Leaving parking	26	0.54
Entering parking	43	0.90
Reversing in stream of traffic	3	0.06
Reversing into fixed object/parked vehicle	1	0.02
Vehicle strikes another veh while emerging from driveway	586	12.23
Vehicle off footpath strikes veh on carriageway	613	12.79
Other manoeuvring not included in dcas 140-148	15	0.31
Head on (overtaking)	10	0.21
Pulling out (overtaking)	17	0.35
Cutting in (overtaking)	5	0.10
Pulling out -rear end	8	0.17
Other overtaking manoeuvres not included in dcas 150-154	3	0.06
Vehicle collides with vehicle parked on left of road	17	0.35
Vehicle strikes door of parked/stationary vehicle	389	8.12
Temporary roadworks	1	0.02
Struck object on carriageway	1	0.02
Other on path	1	0.02
Off carriageway to left	21	0.44
Left off carriageway into object/parked vehicle	8	0.17
Off carriageway to right	2	0.04
Right off carriageway into object/parked vehicle	2	0.04
Out of control on carriageway (on straight)	106	2.21
Off end of road/t-intersection	1	0.02
Other accidents-off straight not included in dcas 170-175	2	0.04
Off right bend into object/parked vehicle	1	0.02
Off left bend into object/parked vehicle	2	0.04

Definition for classifying accidents	Frequency	Percent
Out of control on carriageway (on bend)	2	0.04
Fell in/from vehicle	1	0.02
Load or missile struck vehicle	3	0.06
Unknown - no details on manoeuvres of road users in accident	5	0.10

Table A1.17: *Definition by classifying accidents by bicycle DCA reference*

For DCA descriptions refer to Vic Roads DCA chart at appendix end

Definition for classifying accidents (DCA)	Bicycle DCA reference (N / % / Row % / Column %)				Total
	Vehicle 1	Vehicle 2	Not known which vehicle was number 1	Not involved in initial event	
Ped near side. Ped hit by vehicle from the right	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Veh strikes ped on footpath, median, traffic island	1 0.02 50.00 0.05	1 0.02 50.00 0.04	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Ped struck walking to/from or boarding/alighting vehicle	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Cross traffic (intersections only)	144 3.01 28.29 7.40	357 7.45 70.14 13.04	0 0.00 0.00 0.00	8 0.17 1.57 7.48	509 10.62
Right far (intersections only)	13 0.27 25.00 0.67	39 0.81 75.00 1.42	0 0.00 0.00 0.00	0 0.00 0.00 0.00	52 1.09
Left far (intersections only)	23 0.48 74.19 1.18	8 0.17 25.81 0.29	0 0.00 0.00 0.00	0 0.00 0.00 0.00	31 0.65
Right near (intersections only)	54 1.13 19.01 2.77	227 4.74 79.93 8.29	0 0.00 0.00 0.00	3 0.06 1.06 2.80	284 5.93
Two right turning (intersections only)	6 0.13 40.00 0.31	9 0.19 60.00 0.33	0 0.00 0.00 0.00	0 0.00 0.00 0.00	15 0.31
Right/left far (intersections only)	8 0.17 66.67 0.41	4 0.08 33.33 0.15	0 0.00 0.00 0.00	0 0.00 0.00 0.00	12 0.25
Left near (intersections only)	19 0.40 10.22 0.98	163 3.40 87.63 5.95	0 0.00 0.00 0.00	4 0.08 2.15 3.74	186 3.88
Left/right far (intersections only)	0 0.00 0.00 0.00	1 0.02 100.00 0.04	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02

Definition for classifying accidents (DCA)	Bicycle DCA reference (N / % / Row % / Column %)				Total
	Vehicle 1	Vehicle 2	Not known which vehicle was number 1	Not involved in initial event	
Two left turning (intersections only)	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Other adjacent (intersections only)	11 0.23 55.00 0.57	9 0.19 45.00 0.33	0 0.00 0.00 0.00	0 0.00 0.00 0.00	20 0.42
Head on (not overtaking)	56 1.17 65.12 2.88	28 0.58 32.56 1.02	0 0.00 0.00 0.00	2 0.04 2.33 1.87	86 1.79
Right through	54 1.13 9.84 2.77	477 9.95 86.89 17.42	0 0.00 0.00 0.00	18 0.38 3.28 16.82	549 11.46
Left through	6 0.13 75.00 0.31	2 0.04 25.00 0.07	0 0.00 0.00 0.00	0 0.00 0.00 0.00	8 0.17
Right/left. One veh turning right the other left	4 0.08 66.67 0.21	2 0.04 33.33 0.07	0 0.00 0.00 0.00	0 0.00 0.00 0.00	6 0.13
Right/right. Both vehs from opposite directions turning right	1 0.02 25.00 0.05	3 0.06 75.00 0.11	0 0.00 0.00 0.00	0 0.00 0.00 0.00	4 0.08
Other opposing manoeuvres not included in DCAs 120-125	2 0.04 28.57 0.10	3 0.06 42.86 0.11	1 0.02 14.29 100.00	1 0.02 14.29 0.93	7 0.15
Rear end (vehicles in same lane)	38 0.79 16.74 1.95	174 3.63 76.65 6.36	0 0.00 0.00 0.00	15 0.31 6.61 14.02	227 4.74
Left rear	19 0.40 70.37 0.98	8 0.17 29.63 0.29	0 0.00 0.00 0.00	0 0.00 0.00 0.00	27 0.56
Right rear	7 0.15 21.88 0.36	23 0.48 71.88 0.84	0 0.00 0.00 0.00	2 0.04 6.25 1.87	32 0.67
Lane side swipe (vehicles in parallel lanes)	47 0.98 19.58 2.42	183 3.82 76.25 6.68	0 0.00 0.00 0.00	10 0.21 4.17 9.35	240 5.01
Lane change right (not overtaking)	103 2.15 85.83 5.29	17 0.35 14.17 0.62	0 0.00 0.00 0.00	0 0.00 0.00 0.00	120 2.50
Lane change left (not overtaking)	12 0.25 10.62 0.62	93 1.94 82.30 3.40	0 0.00 0.00 0.00	8 0.17 7.08 7.48	113 2.36
Right turn sideswipe	54 1.13 79.41 2.77	14 0.29 20.59 0.51	0 0.00 0.00 0.00	0 0.00 0.00 0.00	68 1.42
Left turn sideswipe	5 0.10 2.34 0.26	206 4.30 96.26 7.52	0 0.00 0.00 0.00	3 0.06 1.40 2.80	214 4.47

Definition for classifying accidents (DCA)	Bicycle DCA reference (N / % / Row % / Column %)				Total
	Vehicle 1	Vehicle 2	Not known which vehicle was number 1	Not involved in initial event	
Other same direction-manouevres not included in DCA30-137	6 0.13 28.57 0.31	11 0.23 52.38 0.40	0 0.00 0.00 0.00	4 0.08 19.05 3.74	21 0.44
U turn	14 0.29 23.33 0.72	43 0.90 71.67 1.57	0 0.00 0.00 0.00	3 0.06 5.00 2.80	60 1.25
Leaving parking	0 0.00 0.00 0.00	26 0.54 100.00 0.95	0 0.00 0.00 0.00	0 0.00 0.00 0.00	26 0.54
Entering parking	1 0.02 2.33 0.05	42 0.88 97.67 1.53	0 0.00 0.00 0.00	0 0.00 0.00 0.00	43 0.90
Reversing in stream of traffic	1 0.02 33.33 0.05	2 0.04 66.67 0.07	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 0.06
Reversing into fixed object/parked vehicle	0 0.00 0.00 0.00	1 0.02 100.00 0.04	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Vehicle strikes another veh while emerging from driveway	126 2.63 21.50 6.47	457 9.54 77.99 16.69	0 0.00 0.00 0.00	3 0.06 0.51 2.80	586 12.23
Vehicle off footpath strikes veh on carriageway	569 11.87 92.82 29.24	40 0.83 6.53 1.46	0 0.00 0.00 0.00	4 0.08 0.65 3.74	613 12.79
Other manoeuvring not included in DCAs 140-148	8 0.17 53.33 0.41	5 0.10 33.33 0.18	0 0.00 0.00 0.00	2 0.04 13.33 1.87	15 0.31
Head on (overtaking)	6 0.13 60.00 0.31	4 0.08 40.00 0.15	0 0.00 0.00 0.00	0 0.00 0.00 0.00	10 0.21
Pulling out (overtaking)	11 0.23 64.71 0.57	6 0.13 35.29 0.22	0 0.00 0.00 0.00	0 0.00 0.00 0.00	17 0.35
Cutting in (overtaking)	1 0.02 20.00 0.05	4 0.08 80.00 0.15	0 0.00 0.00 0.00	0 0.00 0.00 0.00	5 0.10
Pulling out -rear end	1 0.02 12.50 0.05	7 0.15 87.50 0.26	0 0.00 0.00 0.00	0 0.00 0.00 0.00	8 0.17
Other overtaking manoeuvres not included in DCAs 150-154	1 0.02 33.33 0.05	2 0.04 66.67 0.07	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 0.06
Vehicle collides with vehicle parked on left of road	17 0.35 100.00 0.87	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	17 0.35
Vehicle strikes door of parked/stationary vehicle	347 7.24 89.20 17.83	36 0.75 9.25 1.31	0 0.00 0.00 0.00	6 0.13 1.54 5.61	389 8.12

Definition for classifying accidents (DCA)	Bicycle DCA reference (N / % / Row % / Column %)				Total
	Vehicle 1	Vehicle 2	Not known which vehicle was number 1	Not involved in initial event	
Temporary road works	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Struck object on carriageway	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Other on path	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Off carriageway to left	20 0.42 95.24 1.03	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02 4.76 0.93	21 0.44
Left off carriageway into object/parked vehicle	5 0.10 62.50 0.26	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 0.06 37.50 2.80	8 0.17
Off carriageway to right	2 0.04 100.00 0.10	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Right off carriageway into object/parked vehicle	2 0.04 100.00 0.10	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Out of control on carriageway (on straight)	104 2.17 98.11 5.34	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04 1.89 1.87	106 2.21
Off end of road/t-intersection	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02 100.00 0.93	1 0.02
Other accidents-off straight not included in DCAs 170-175	1 0.02 50.00 0.05	1 0.02 50.00 0.04	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Off right bend into object/parked vehicle	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02 100.00 0.93	1 0.02
Off left bend into object/parked vehicle	2 0.04 100.00 0.10	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Out of control on carriageway (on bend)	2 0.04 100.00 0.10	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Fell in/from vehicle	1 0.02 100.00 0.05	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Load or missile struck vehicle	3 0.06 100.00 0.15	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 0.06
Unknown - no details on manoeuvres of road users in accident	2 0.04 40.00 0.10	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 0.06 60.00 2.80	5 0.10

Definition for classifying accidents (DCA)	Bicycle DCA reference (N / % / Row % / Column %)				Total
	Vehicle	Vehicle 2	Not known which vehicle was number 1	initial event	
Total	1946 40.61	2738 57.14	1 0.02	107 2.23	4792 100.00

Weather and light conditions

Table A1.18: *Light conditions*

Light conditions	Frequency	Percent
Day	3748	77.57
Dusk/dawn	487	10.08
Dark st lights on	500	10.35
Dark st lights off	9	0.19
Dark no st lights	42	0.87
Dark st lights unk	23	0.48
Unknown	23	0.48
Total	4832	100.00

Table A1.19: *Weather conditions*

Weather condition	Weather condition (N / % / Row % / Column %)							Total
		Clear	Raining	Fog	Dust	Strong winds	Unknown	
Clear	4490 92.92 99.53 93.48	0 0.00 0.00 0.00	2 0.04 0.04 100.00	2 0.04 0.04 100.00	0 0.00 0.00 0.00	16 0.33 0.35 80.00	1 0.02 0.02 100.00	4511 93.36
Raining	214 4.43 98.17 4.46	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	4 0.08 1.83 20.00	0 0.00 0.00 0.00	218 4.51
Snowing	1 0.02 100.00 0.02	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Fog	10 0.21 100.00 0.21	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	10 0.21
Smoke	1 0.02 100.00 0.02	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.02
Dust	2 0.04 100.00 0.04	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04
Strong winds	6 0.12 60.00 0.12	2 0.04 20.00 100.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.04 20.00 100.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	10 0.21

Unknown	79	0	0	0	0	0	0	79
	1.63	0.00	0.00	0.00	0.00	0.00	0.00	1.63
	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.64	0.00	0.00	0.00	0.00	0.00	0.00	
Total	4803	2	2	2	2	20	1	4832
	99.40	0.04	0.04	0.04	0.04	0.41	0.02	100.00

Bicycle rider injury severity

Table A1.20: *Bicycle rider injury severity by DCA*

Definition for classifying accidents (DCA)	Bicycle rider injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Ped near side. Ped hit by vehicle from the right	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Veh strikes ped on footpath,median,traffic island	1 0.02 50.00 0.03	1 0.02 50.00 0.07	2 0.04
Ped struck walking to/from or boarding/alighting vehicle	0 0.00 0.00 0.00	1 0.02 100.00 0.07	1 0.02
Cross traffic(intersections only)	348 7.26 68.37 10.32	161 3.36 31.63 11.35	509 10.62
Right far (intersections only)	37 0.77 71.15 1.10	15 0.31 28.85 1.06	52 1.09
Left far (intersections only)	20 0.42 64.52 0.59	11 0.23 35.48 0.78	31 0.65
Right near (intersections only)	201 4.19 70.77 5.96	83 1.73 29.23 5.85	284 5.93
Two right turning (intersections only)	9 0.19 60.00 0.27	6 0.13 40.00 0.42	15 0.31
Right/left far (intersections only)	10 0.21 83.33 0.30	2 0.04 16.67 0.14	12 0.25
Left near (intersections only)	151 3.15 81.18 4.48	35 0.73 18.82 2.47	186 3.88
Left/right far (intersections only)	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Two left turning (intersections only)	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Other adjacent (intersections only)	11 0.23 55.00 0.33	9 0.19 45.00 0.63	20 0.42
Head on (not overtaking)	48 1.00 55.81 1.42	38 0.79 44.19 2.68	86 1.79

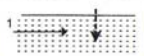
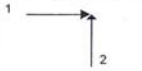
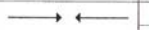
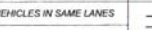
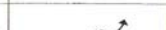
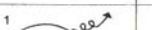
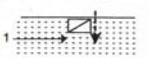
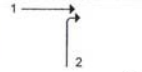
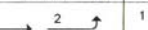
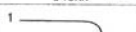
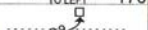
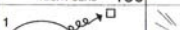
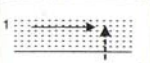
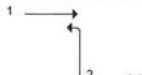
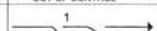
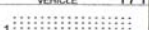
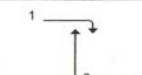
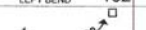
Definition for classifying accidents (DCA)	Bicycle rider injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Right through	359 7.49 65.39 10.64	190 3.96 34.61 13.39	549 11.46
Left through	5 0.10 62.50 0.15	3 0.06 37.50 0.21	8 0.17
Right/left. One veh turning right the other left	5 0.10 83.33 0.15	1 0.02 16.67 0.07	6 0.13
Right/right. Both vehs from opposite directions turning right	4 0.08 100.00 0.12	0 0.00 0.00 0.00	4 0.08
Other opposing manoeuvres not included in DCAs 120-125	7 0.15 100.00 0.21	0 0.00 0.00 0.00	7 0.15
Rear end(vehicles in same lane)	158 3.30 69.60 4.68	69 1.44 30.40 4.86	227 4.74
Left rear	21 0.44 77.78 0.62	6 0.13 22.22 0.42	27 0.56
Right rear	24 0.50 75.00 0.71	8 0.17 25.00 0.56	32 0.67
Lane side swipe (vehicles in parallel lanes)	187 3.90 77.92 5.54	53 1.11 22.08 3.74	240 5.01
Lane change right (not overtaking)	68 1.42 56.67 2.02	52 1.09 43.33 3.66	120 2.50
Lane change left (not overtaking)	81 1.69 71.68 2.40	32 0.67 28.32 2.26	113 2.36
Right turn sideswipe	45 0.94 66.18 1.33	23 0.48 33.82 1.62	68 1.42
Left turn sideswipe	173 3.61 80.84 5.13	41 0.86 19.16 2.89	214 4.47
Other same direction-manoeuvres not included in DCAs 130-137	14 0.29 66.67 0.42	7 0.15 33.33 0.49	21 0.44
U turn	37 0.77 61.67 1.10	23 0.48 38.33 1.62	60 1.25
Leaving parking	20 0.42 76.92 0.59	6 0.13 23.08 0.42	26 0.54

Definition for classifying accidents (DCA)	Bicycle rider injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Entering parking	35 0.73 81.40 1.04	8 0.17 18.60 0.56	43 0.90
Reversing in stream of traffic	3 0.06 100.00 0.09	0 0.00 0.00 0.00	3 0.06
Reversing into fixed object/parked vehicle	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Vehicle strikes another veh while emerging from driveway	427 8.91 72.87 12.66	159 3.32 27.13 11.21	586 12.23
Vehicle off footpath strikes veh on carriageway	412 8.60 67.21 12.21	201 4.19 32.79 14.16	613 12.79
Other manoeuvring not included in DCAs 140-148	11 0.23 73.33 0.33	4 0.08 26.67 0.28	15 0.31
Head on (overtaking)	6 0.13 60.00 0.18	4 0.08 40.00 0.28	10 0.21
Pulling out (overtaking)	14 0.29 82.35 0.42	3 0.06 17.65 0.21	17 0.35
Cutting in (overtaking)	4 0.08 80.00 0.12	1 0.02 20.00 0.07	5 0.10
Pulling out -rear end	5 0.10 62.50 0.15	3 0.06 37.50 0.21	8 0.17
Other overtaking manoeuvres not included in DCAs 150-154	2 0.04 66.67 0.06	1 0.02 33.33 0.07	3 0.06
Vehicle collides with vehicle parked on left of road	6 0.13 35.29 0.18	11 0.23 64.71 0.78	17 0.35
Vehicle strikes door of parked/stationary vehicle	285 5.95 73.26 8.45	104 2.17 26.74 7.33	389 8.12
Temporary road works	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Struck object on carriageway	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Other on path	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02

Definition for classifying accidents (DCA)	Bicycle rider injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Off carriageway to left	15 0.31 71.43 0.44	6 0.13 28.57 0.42	21 0.44
Left off carriageway into object/parked vehicle	7 0.15 87.50 0.21	1 0.02 12.50 0.07	8 0.17
Off carriageway to right	1 0.02 50.00 0.03	1 0.02 50.00 0.07	2 0.04
Right off carriageway into object/parked vehicle	2 0.04 100.00 0.06	0 0.00 0.00 0.00	2 0.04
Out of control on carriageway (on straight)	79 1.65 74.53 2.34	27 0.56 25.47 1.90	106 2.21
Off end of road/t-intersection	0 0.00 0.00 0.00	1 0.02 100.00 0.07	1 0.02
Other accidents-off straight not included in DCAs 170-175	1 0.02 50.00 0.03	1 0.02 50.00 0.07	2 0.04
Off right bend into object/parked vehicle	0 0.00 0.00 0.00	1 0.02 100.00 0.07	1 0.02
Off left bend into object/parked vehicle	1 0.02 50.00 0.03	1 0.02 50.00 0.07	2 0.04
Out of control on carriageway (on bend)	0 0.00 0.00 0.00	2 0.04 100.00 0.14	2 0.04
Fell in/from vehicle	1 0.02 100.00 0.03	0 0.00 0.00 0.00	1 0.02
Load or missile struck vehicle	2 0.04 66.67 0.06	1 0.02 33.33 0.07	3 0.06
Unknown - no details on manoeuvres of road users in accident	3 0.06 60.00 0.09	2 0.04 40.00 0.14	5 0.10
Total	3373 70.39	1419 29.61	4792 100.00

vicroads Information Services

DEFINITIONS FOR CLASSIFYING ACCIDENTS

Pedestrian on foot in toy/pram	Vehicles from adjacent directions (intersections only)	Vehicles from opposing directions	Vehicles from same direction	Manoeuvring	Overtaking	On path	Off path on straight	Off path on curve	Passenger and miscellaneous
 NEAR SIDE 100	 CROSS TRAFFIC 110	 HEAD ON (NOT OVERTAKING) 120	*VEHICLES IN SAME LANES*  REAR END 130	 U TURN 140	HEAD ON (INCL SIDE SWIPE) 150	 PARKED 160	 OFF CARRIAGEWAY TO LEFT 170	 OFF CARRIAGWAY RIGHT BEND 180	 FELL IN/FROM VEHICLE 190
 EMERGING 101	 RIGHT FAR 111	 RIGHT THRU 121	 LEFT REAR 131	 U TURN INTO FIXED OBJECT/ PARKED VEHICLE 141	 OUT OF CONTROL 151	 DOUBLE PARKED 161	 LEFT OFF CARRIAGEWAY INTO OBJECT/PARKED VEHICLE 171	 OFF RIGHT BEND INTO OBJECT/PARKED VEHICLE 181	 LOAD OR MISSILE STRUCK VEHICLE 191
 FAR SIDE 102	 LEFT FAR 112	LEFT THRU 122	 RIGHT END 132	LEAVING PARKING 142	 PULLING OUT 152	 ACCIDENT OR BROKEN DOWN 162	 OFF CARRIAGEWAY TO RIGHT 172	 OFF CARRIAGWAY LEFT BEND 182	 STRUCK TRAIN 192
 Playing, working, lying, standing on carriageway 103	 RIGHT NEAR 113	 RIGHT LEFT 123	*VEHICLES IN PARRALLEL LANES*  LANE SIDE SWIPE 133	ENTERING PARKING 143	 CUTTING IN 153	 VEHICLE DOOR 163	 RIGHT OFF CARRIAGEWAY INTO OBJECT/PARKED VEHICLE 173	 OFF LEFT BEND INTO OBJECT/PARKED VEHICLE 183	 STRUCK RAILWAY CROSSING FURNITURE 193
WALKING WITH TRAFFIC 104	TWO RIGHT TURNING 114	RIGHT RIGHT 124	LANE CHANGE RIGHT (NOT OVERTAKING) 134	PARKING VEHICLES ONLY 144	PULLING OUT REAR END 154	PERMANENT OBSTRUCTION ON CARRIAGEWAY 164	OUT OF CONTROL ON CARRIAGEWAY 174	OUT OF CONTROL ON CARRIAGEWAY 184	PARKED CAR RUN AWAY 194
FACING TRAFFIC 105	RIGHT/LEFT FAR 115	LEFT LEFT 125	LANE CHANGE LEFT 135	REVERSING 145		TEMPORARY ROADWORKS 165	OFF END OF ROAD/ T INTERSECTION 175		
ON FOOTPATH/ MEDIAN 106	LEFT NEAR 116	126	RIGHT TURN SIDE SWIPE 136	REVERSING INTO FIXED OBJECT/ PARKED VEHICLE 146		STRUCK OBJECT ON CARRIAGEWAY 166			
DRIVEWAY 107	RIGHT/LEFT NEAR 117	127	LEFT TURN SIDE SWIPE 137	EMERGING FROM DRIVEWAY/LANE 147		ANIMAL (NOT RIDDEN) 167			
STRUCK WHILE BOARDING OR ALIGHTING VEHICLE 108	TWO LEFT TURN 118	128	138	FROM FOOTWAY 148					*OTHER* 198
OTHER PEDESTRIAN 109	OTHER ADJACENT 119	OTHER CROSSING 129	OTHER SAME DIRECTION 139	OTHER MANOEUVRING 149	OTHER OVERTAKING 159	OTHER ON PATH 169	OTHER STRAIGHT 179	OTHER CURVE 189	? *UNKNOWN* 199

1. DEFINITION FOR CLASSIFYING ACCIDENTS (DCA) SHOULD BE DETERMINED BY FIRST SELECTING A COLUMN USING THE TEXT ABOVE EACH COLUMN AND THEN BY DIAGRAMATIC SUB-DIVIVISION
2. THE SUB-DIVISION CHOSEN SHOULD BE DESCRIBE THE GENERAL MOVEMENT OF VEHICLES INVOLVED IN THE INITIAL EVENT. IT DOES NOT ASSIGN A CAUSE TO THE ACCIDENT
3. SUPPLEMENTARY CODES HAVE BEEN DEFINED FOR MOST SUB-DIVISION. THESE CODES GIVE FURTHER DETAIL OF THE INITIAL EVENT.
4. THE NUMBER 1, 2 INDENTIFY INDIVIDUAL VEHICLES INVOLVED WHEN THE DCA IS LINKED WITH OTHER VEHICLE/DRIVER INFORMATION.
5. THESE CODES WERE USED FOR 1987 ACCIDENTS AND REPLACE THE ROAD MOVEMENT (RUM) CODE.

APPENDIX 2

QUEENSLAND BICYCLE AND MOTOR VEHICLE CRASH CHARACTERISTICS

ADDITIONAL TABLES

QUEENSLAND CRASHES DURING 2000-2004

Temporal characteristics

Table A2.1: *Day of week*

Day of week	Frequency	Percent
Sunday	294	7.82
Monday	557	14.82
Tuesday	605	16.09
Wednesday	660	17.56
Thursday	622	16.55
Friday	610	16.23
Saturday	411	10.93

Helmet use

Table A2.2: *Helmet use*

Helmet use	Frequency	Percent
Unknown	554	14.74
Worn	2689	71.53
Not worn	515	13.70
Not applicable	1	0.03

Accident nature and site features

Table A2.3: *Accident type*

Accident type	Frequency	Percent
Hit parked vehicle	218	5.80
Angle	2725	72.49
Rear-end	180	4.79
Head-on	65	1.73
Sideswipe	486	12.93
Hit fixed obstruct/temp object	31	0.82
Fall from moving vehicle	13	0.35
Motor/pedal cycle overturn/fall/drop	17	0.45
Hit pedestrian	5	0.13
Hit animal	3	0.08

Accident type	Frequency	Percent
Struck by external load	3	0.08
Collision crash	1	0.03
Non-collision crash	1	0.03
Other	11	0.29

Table A2.4: *Number of units involved*

Number of units involved	Frequency	Percent
2	3570	94.97
3	148	3.94
4	30	0.80
5	11	0.29

Table A2.5: *Divided Road*

Divided road	Frequency	Percent
N	2405	63.98
Y	1354	36.02

Table A2.6: *On/off carriageway*

On/off carriageway	Frequency	Percent
Other/unknown	1578	41.98
On carriageway	1957	52.06
Off carriageway	224	5.96

Table A2.7: *Road feature*

Road feature	Frequency	Percent
Other	17	0.45
Cross intersection	639	17.00
T-junction	1127	29.98
Y-junction	8	0.21
Multiple road	6	0.16
Interchange	32	0.85
Roundabout	312	8.30

Road feature	Frequency	Percent
Bridge/causeway	13	0.35
Median opening	15	0.40
Merge lane	6	0.16
Not applicable	1584	42.14

Table A2.8: *Traffic controls*

Traffic controls	Frequency	Percent
Police	2	0.05
Road/rail workers	2	0.05
Operating traffic lights	444	11.81
Stop sign	155	4.12
Give way	630	16.76
Pedestrian crossing	67	1.78
School crossing-flags only	1	0.03
Miscellaneous	9	0.24
No traffic control	2449	65.15

Table A2.9: *Speed zone at accident site*

Speed zone at accident site	Frequency	Percent
10 km/hr	10	0.27
15 km/hr	3	0.08
20 km/hr	7	0.19
30 km/hr	5	0.13
40 km/hh	121	3.22
50 km/hr	654	17.40
60 km/hr	2587	68.82
70 km/hr	160	4.26
80 km/hr	138	3.67
90 km/hr	2	0.05
100 km/hr	70	1.86
110 km/hr	2	0.05

Table A2.10: *Definition for classifying accidents*

Definition for classifying accidents (DCA)	Frequency	Percent
Unknown - no details on manoeuvres of road users in accident	57	1.52
Ped on footpath struck by veh entering/leaving driveway	1	0.03
Any manoeuvre involving ped not included in DCAs 100-108	2	0.05
Cross traffic(intersections only)	348	9.26
Right far (intersections only)	40	1.06
Left far (intersections only)	83	2.21
Right near (intersections only)	250	6.65
Two right turning (intersections only)	24	0.64
Right/left far (intersections only)	28	0.74
Left near (intersections only)	179	4.76
Other adjacent (intersections only)	227	6.04
Head on (not overtaking)	76	2.02
Right through	350	9.31
Left through	11	0.29
Right/left. One veh turning right the other left	11	0.29
Right/right. Both vehs from opposite directions turning right	3	0.08
Other opposing manoeuvres not included in DCAs 120-125	4	0.11
Rear end(vehicles in same lane)	114	3.03
Left rear	13	0.35
Right rear	15	0.40
Lane side swipe (vehicles in parallel lanes)	255	6.78
Lane change right (not overtaking)	18	0.48
Lane change left (not overtaking)	24	0.64
Right turn sideswipe	143	3.80
Left turn sideswipe	193	5.13
Other same direction-manouevres not included in DCAs 130-137	29	0.77
U turn	10	0.27
Leaving parking	16	0.43
Entering parking	13	0.35

Definition for classifying accidents (DCA)	Frequency	Percent
Parked vehicles only	1	0.03
Reversing in stream of traffic	3	0.08
Vehicle strikes another veh while emerging from driveway	159	4.23
Vehicle off footpath strikes veh on carriageway	447	11.89
Other manoeuvring not included in DCAs 140-148	326	8.67
Head on (overtaking)	4	0.11
Pulling out (overtaking)	12	0.32
Cutting in (overtaking)	3	0.08
Other overtaking manoeuvres not included in DCAs 150-154	9	0.24
Vehicle collides with vehicle parked on left of road	54	1.44
Vehicle strikes door of parked/stationary vehicle	143	3.80
Struck object on carriageway	2	0.05
Left off carriageway into object/parked vehicle	40	1.06
Right off carriageway into object/parked vehicle	3	0.08
Other accidents-off straight not included in DCAs 170-175	2	0.05
Off right bend into object/parked vehicle	2	0.05
Load or missile struck vehicle	3	0.08
Other accidents not classifiable elsewhere	9	0.24

Light conditions

Table A2.11: *Light conditions*

Light conditions	Frequency	Percent
Daylight	3120	83.00
Dawn/dusk	228	6.07
Darkness lighted	319	8.49
Darkness unlighted	80	2.13
Unknown	12	0.32

Road Conditions

Table A2.12: *Vertical alignment*

Vertical alignment of road	Frequency	Percent
Level	2992	79.60
Grade	608	16.17
Crest	63	1.68
Dip	96	2.55

Table A2.13: *Horizontal alignment*

Horizontal alignment of road	Frequency	Percent
Straight	3354	89.23
Curve-view obstructed	99	2.63
Curve-view open	306	8.14

Table A2.14: *Road surface conditions*

Road surface conditions	Frequency	Percent
Sealed-Dry	3512	93.43
Sealed-Wet	230	6.12
Unsealed-Dry	6	0.16
Unknown	11	0.29

Bicycle rider injury severity

Table A2.15: *Injury severity by definition for classifying accidents*

Definition for classifying accidents (DCA)	Injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Unknown - no details on manoeuvres of road users in accident	3 0.08 100.00 0.12	0 0.00 0.00 0.00	3 0.08
Any manoeuvre involving ped not included in DCAs 100-108	1 0.03 100.00 0.04	0 0.00 0.00 0.00	1 0.03
Cross traffic(intersections only)	218 5.97 63.74 8.87	124 3.39 36.26 10.37	342 9.36
Right far (intersections only)	37 1.01 92.50 1.51	3 0.08 7.50 0.25	40 1.09

Definition for classifying accidents (DCA)	Injury severity (N / % / Row % / Column %)		
	Injured	Killed or seriously injured	Total
Left far (intersections only)	58 1.59 71.60 2.36	23 0.63 28.40 1.92	81 2.22
Right near (intersections only)	155 4.24 62.50 6.31	93 2.55 37.50 7.78	248 6.79
Two right turning (intersections only)	17 0.47 70.83 0.69	7 0.19 29.17 0.59	24 0.66
Right/left far (intersections only)	15 0.41 53.57 0.61	13 0.36 46.43 1.09	28 0.77
Left near (intersections only)	134 3.67 75.28 5.45	44 1.20 24.72 3.68	178 4.87
Other adjacent (intersections only)	143 3.91 63.56 5.82	82 2.24 36.44 6.86	225 6.16
Head on (not overtaking)	38 1.04 50.00 1.55	38 1.04 50.00 3.18	76 2.08
Right through	219 6.00 63.48 8.91	126 3.45 36.52 10.54	345 9.44
Left through	8 0.22 80.00 0.33	2 0.05 20.00 0.17	10 0.27
Right/left. One veh turning right the other left	7 0.19 63.64 0.28	4 0.11 36.36 0.33	11 0.30
Right/right. Both vehs from opposite directions turning right	3 0.08 100.00 0.12	0 0.00 0.00 0.00	3 0.08
Other opposing manoeuvres not included in DCAs 120-125	2 0.05 50.00 0.08	2 0.05 50.00 0.17	4 0.11
Rear end(vehicles in same lane)	63 1.72 58.33 2.56	45 1.23 41.67 3.76	108 2.96
Left rear	11 0.30 84.62 0.45	2 0.05 15.38 0.17	13 0.36
Right rear	9 0.25 60.00 0.37	6 0.16 40.00 0.50	15 0.41
Lane side swipe (vehicles in parallel lanes)	154 4.22 61.11 6.27	98 2.68 38.89 8.19	252 6.90

Definition for classifying accidents (DCA)	Injury severity (N / % / Row % / Column %)		
	Injured	Killed or seriously injured	Total
Lane change right (not overtaking)	12 0.33 70.59 0.49	5 0.14 29.41 0.42	17 0.47
Lane change left (not overtaking)	16 0.44 72.73 0.65	6 0.16 27.27 0.50	22 0.60
Right turn sideswipe	91 2.49 64.54 3.70	50 1.37 35.46 4.18	141 3.86
Left turn sideswipe	153 4.19 79.27 6.23	40 1.09 20.73 3.34	193 5.28
Other same direction-manouevres not included in DCAs 130-137	25 0.68 86.21 1.02	4 0.11 13.79 0.33	29 0.79
U turn	5 0.14 50.00 0.20	5 0.14 50.00 0.42	10 0.27
Leaving parking	11 0.30 68.75 0.45	5 0.14 31.25 0.42	16 0.44
Entering parking	12 0.33 92.31 0.49	1 0.03 7.69 0.08	13 0.36
Parked vehicles only	1 0.03 100.00 0.04	0 0.00 0.00 0.00	1 0.03
Reversing in stream of traffic	2 0.05 66.67 0.08	1 0.03 33.33 0.08	3 0.08
Vehicle strikes another veh while emerging from driveway	105 2.87 67.31 4.27	51 1.40 32.69 4.26	156 4.27
Vehicle off footpath strikes veh on carriageway	304 8.32 68.31 12.37	141 3.86 31.69 11.79	445 12.18
Other manoeuvring not included in DCAs 140-148	239 6.54 75.16 9.73	79 2.16 24.84 6.61	318 8.71
Head on (overtaking)	1 0.03 25.00 0.04	3 0.08 75.00 0.25	4 0.11
Pulling out (overtaking)	10 0.27 83.33 0.41	2 0.05 16.67 0.17	12 0.33
Cutting in (overtaking)	1 0.03 33.33 0.04	2 0.05 66.67 0.17	3 0.08

Definition for classifying accidents (DCA)	Injury severity (N / % / Row % / Column %)		
	Injured	Killed or seriously injured	Total
Other overtaking manoeuvres not included in DCAs 150-154	6 0.16 66.67 0.24	3 0.08 33.33 0.25	9 0.25
Vehicle collides with vehicle parked on left of road	37 1.01 68.52 1.51	17 0.47 31.48 1.42	54 1.48
Vehicle strikes door of parked/stationary vehicle	97 2.66 69.29 3.95	43 1.18 30.71 3.60	140 3.83
Struck object on carriageway	2 0.05 100.00 0.08	0 0.00 0.00 0.00	2 0.05
Left off carriageway into object/parked vehicle	22 0.60 56.41 0.90	17 0.47 43.59 1.42	39 1.07
Right off carriageway into object/parked vehicle	2 0.05 66.67 0.08	1 0.03 33.33 0.08	3 0.08
Other accidents-off straight not included in DCAs 170-175	2 0.05 100.00 0.08	0 0.00 0.00 0.00	2 0.05
Off right bend into object/parked vehicle	1 0.03 50.00 0.04	1 0.03 50.00 0.08	2 0.05
Load or missile struck vehicle	2 0.05 66.67 0.08	1 0.03 33.33 0.08	3 0.08
Other accidents not classifiable elsewhere	3 0.08 33.33 0.12	6 0.16 66.67 0.50	9 0.25
Total	2457 67.26	1196 32.74	3653 100.00

APPENDIX 3

WESTERN AUSTRALIAN BICYCLE AND MOTOR VEHICLE CRASH CHARACTERISTICS

ADDITIONAL TABLES

WESTERN AUSTRALIAN CRASHES DURING 2000-2004

Temporal characteristics

Table A3.1: *Day of week*

Day of week	Frequency	Percent
Sunday	199	7.01
Monday	423	14.91
Tuesday	492	17.34
Wednesday	490	17.27
Thursday	522	18.40
Friday	435	15.33
Saturday	276	9.73

Helmet use

TableA3.2: *Helmet use*

Helmet use	Frequency	Percent
	2584	91.08
Worn	251	8.85
Not Worn	2	0.07

Accident nature and site features

Table A3.3: *Number of units involved*

Number of units involved	Frequency	Percent
1	2785	98.17
2	49	1.73
3	3	0.11

Table A3.4: *Accident type*

Accident type	Frequency	Percent
Mid block	1419	50.02
Intersection	1391	49.03
Cycle path	1	0.04
Roads open to public access	21	0.74
Location not known	5	0.18

Table A3.5: *MR nature code*

MR Nature Code	Frequency	Percent
Unknown	405	14.28
Rear end	208	7.33
Head on	31	1.09
Sideswipe same dirn	437	15.40
Right angle	1497	52.77
Right turn thru	198	6.98
Hit pedestrian	1	0.04
Hit obj	22	0.78
Non collision	38	1.34

Table A3.6: *MR type code*

MR Type Code	Frequency	Percent
Unknown	1904	67.11
Involving overtaking	188	6.63
Involving parking	110	3.88
Involving animal	1	0.04
Involving pedestrian	5	0.18
Entering / leaving driveway	629	22.17

Table A3.7: *No collision code*

No collision code	Frequency	Percent
Not applicable	2791	98.38
Overturns	38	1.34
Falls from moving veh	3	0.11
Other non-collision	5	0.18

Table A3.8: *First object hit*

First Object Hit	Frequency	Percent
Not applicable	2827	99.65
Sec pole	1	0.04
Other pole	1	0.04
Tree	2	0.07
Kerb when stated as cause	2	0.07
Veh parked off cway	4	0.14

Table A3.9: *Second object hit*

Second Object Hit	Frequency	Percent
Unknown	2836	99.96
Kerb when stated as cause	1	0.04

Table A3.10: *Carriageway*

Carriageway	Frequency	Percent
	31	1.09
L	513	18.08
R	119	4.19
S	2174	76.63

Table A3.11: *Road works site*

Road Works Site	Frequency	Percent
	1237	43.60
No	1592	56.12
Yes	8	0.28

Table A3.12: *Road features*

Road feature	Frequency	Percent
Unknown	739	26.05
4-way intx	443	15.62
3-way intx (t-junction)	780	27.49
Intx > 4 legs	2	0.07
Roundabout	181	6.38
Median opening	22	0.78
Rail xing	4	0.14
Bridge	7	0.25
Driveway	644	22.70
Mid block latm device (slow pt sp hump etc.)	4	0.14
Pedestrian refuge island	11	0.39

Table A3.13: *Traffic controls*

Traffic controls	Frequency	Percent
Unknown	26	0.92
Intersection traffic lights	275	9.69
Stop sign	243	8.57
Give way sign	384	13.54
Zebra crossing	11	0.39
Rail xing - boomgates	3	0.11
Rail xing - flashing lights only	1	0.04
School crossing	10	0.35
No sign or control	1868	65.84
Pointsman	1	0.04
Traffic lights & give way sign	12	0.42
Mid block traffic lights	3	0.11

Table A3.14: *Traffic control functioning*

Traffic Control Functioning	Frequency	Percent
	2510	88.47
Yes	327	11.53

Table A3.15: *Speed zone at accident site*

Speed zone at accident site	Frequency	Percent
Not known	914	32.22
10 km/hr	2	0.07
25 km/hr	1	0.04
30 km/hr	1	0.04
40 km/hh	63	2.22
50 km/hr	501	17.66
60 km/hr	1138	40.11
70 km/hr	130	4.58
80 km/hr	58	2.04
90 km/hr	12	0.42
100 km/hr	9	0.32
110 km/hr	8	0.28

Table A3.16: *Road user movement*

Road user movement	Frequency	Percent
Intx: other	88	3.10
Intx: thru - thru	504	17.77
Intx: right - thru	48	1.69
Intx: left - thru	86	3.03
Intx: thru - right	144	5.08
Intx: right - right	16	0.56
Intx: left - right	8	0.28
Intx: thru - left	112	3.95
Opposite dirn: other	3	0.11
Opposite dirn: head on	31	1.09

Road user movement	Frequency	Percent
Opposite dirn: thru - right	196	6.91
Opposite dirn: right - left	6	0.21
Opposite dirn: thru - left	14	0.49
Opposite dirn: u - turn	2	0.07
Same dirn: other	8	0.28
Same dirn: same lane rear end	133	4.69
Same dirn: same lane left rear	25	0.88
Same dirn: same lane right rear	21	0.74
Same dirn: same lane u - turn	6	0.21
Same dirn: parallel lanes - s/swipe	123	4.34
Same dirn: change lanes - right	30	1.06
Same dirn: change lanes - left	19	0.67
Same dirn: parallel lanes - turn right s/swipe	42	1.48
Same dirn: parallel lanes - turn left s/swipe	100	3.52
Manoeuv: other	355	12.51
Manoeuv: leaving parking	7	0.25
Manoeuv: parking	3	0.11
Manoeuv: parking veh only	1	0.04
Manoeuv: reversing in traffic	8	0.28
Manoeuv: leaving driveway	179	6.31
Manoeuv: from footway	312	11.00
Overtaking: other	2	0.07
Overtaking: pulling out	1	0.04
Overtaking: cutting in	1	0.04
Overtaking: into right turn	18	0.63
On path: other	6	0.21
On path: parked	29	1.02
On path: accident or breakdown	4	0.14
On path: open car door	70	2.47

Road user movement	Frequency	Percent
Off path on straight: off left cway	3	0.11
Off path on straight: off left cway obj	13	0.46
Off path on straight: off right cway obj	6	0.21
Off path on straight: lost control on cway	35	1.23
Loss of control: left turn - intx	1	0.04
Off path on curve: off right bend in obj	2	0.07
Misc: passenger fell in / from veh	5	0.18
Misc: load struck veh	1	0.04
Misc: parked car ran away	2	0.07
Misc: veh movement unknown	7	0.25
Pedest: other	1	0.04

Weather and light conditions

Table A3.17: *Atmospheric conditions*

Atmospheric Condition	Frequency	Percent
Unknown	85	3.00
Clear	2439	85.97
Raining	105	3.70
Fog / smoke / dust	5	0.18
Overcast	201	7.08
Fog / mist	2	0.07

Table A3.18: *Light conditions*

Light conditions	Frequency	Percent
unknown	42	1.48
Daylight	2404	84.74
Dawn or dusk	138	4.86
Dark - street lights on	224	7.90
Dark - street lights off	11	0.39
Dark - street lights not provided	18	0.63

Road conditions

Table A3.19: *Road condition*

Road Condition	Frequency	Percent
Unknown	71	2.50
Wet	226	7.97
Dry	2540	89.53

Table A3.20: *Road alignment*

Road alignment	Frequency	Percent
Unknown	176	6.20
Curve	385	13.57
Straight	2276	80.23

Table A3.21: *Road gradient*

Road gradient	Frequency	Percent
Unknown	112	3.95
Level	2067	72.86
Crest of hill	70	2.47
Slope	588	20.73

Table A3.22: *Road surface conditions*

Road surface conditions	Frequency	Percent
Unknown	75	2.64
Sealed	2741	96.62
Unsealed	21	0.74

Bicycle rider injury severity

Table A3.23: *Serious injury by road user movement*

Road user movement (RUM)	Injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Intx: other	46 2.37 74.19 3.14	16 0.82 25.81 3.35	62 3.19
Intx: thru - thru	280 14.40 74.07 19.10	98 5.04 25.93 20.50	378 19.44
Intx: right - thru	21 1.08 80.77 1.43	5 0.26 19.23 1.05	26 1.34
Intx: left - thru	42 2.16 85.71 2.86	7 0.36 14.29 1.46	49 2.52
Intx: thru - right	69 3.55 69.00 4.71	31 1.59 31.00 6.49	100 5.14
Intx: right - right	10 0.51 90.91 0.68	1 0.05 9.09 0.21	11 0.57
Intx: left - right	6 0.31 100.00 0.41	0 0.00 0.00 0.00	6 0.31
Intx: thru - left	64 3.29 82.05 4.37	14 0.72 17.95 2.93	78 4.01
Opposite dirn: other	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Opposite dirn: head on	8 0.41 61.54 0.55	5 0.26 38.46 1.05	13 0.67
Opposite dirn: thru - right	106 5.45 67.95 7.23	50 2.57 32.05 10.46	156 8.02
Opposite dirn: right - left	3 0.15 100.00 0.20	0 0.00 0.00 0.00	3 0.15
Opposite dirn: thru - left	4 0.21 66.67 0.27	2 0.10 33.33 0.42	6 0.31
Opposite dirn: u - turn	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Same dirn: other	4 0.21 100.00 0.27	0 0.00 0.00 0.00	4 0.21

Road user movement (RUM)	Injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Same dirn: same lane rear end	64 3.29 60.38 4.37	42 2.16 39.62 8.79	106 5.45
Same dirn: same lane left rear	11 0.57 91.67 0.75	1 0.05 8.33 0.21	12 0.62
Same dirn: same lane right rear	11 0.57 84.62 0.75	2 0.10 15.38 0.42	13 0.67
Same dirn: same lane u - turn	4 0.21 80.00 0.27	1 0.05 20.00 0.21	5 0.26
Same dirn: parallel lanes - s/swipe	63 3.24 75.00 4.30	21 1.08 25.00 4.39	84 4.32
Same dirn: change lanes - right	12 0.62 57.14 0.82	9 0.46 42.86 1.88	21 1.08
Same dirn: change lanes - left	11 0.57 73.33 0.75	4 0.21 26.67 0.84	15 0.77
Same dirn: parallel lanes - turn right s/swipe	22 1.13 66.67 1.50	11 0.57 33.33 2.30	33 1.70
Same dirn: parallel lanes - turn left s/swipe	62 3.19 86.11 4.23	10 0.51 13.89 2.09	72 3.70
Manoeuv: other	179 9.21 82.11 12.21	39 2.01 17.89 8.16	218 11.21
Manoeuv: leaving parking	6 0.31 100.00 0.41	0 0.00 0.00 0.00	6 0.31
Manoeuv: parking	3 0.15 100.00 0.20	0 0.00 0.00 0.00	3 0.15
Manoeuv: reversing in traffic	1 0.05 33.33 0.07	2 0.10 66.67 0.42	3 0.15
Manoeuv: leaving driveway	81 4.17 75.70 5.53	26 1.34 24.30 5.44	107 5.50
Manoeuv: from footway	144 7.41 72.00 9.82	56 2.88 28.00 11.72	200 10.29
Overtaking: other	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05

Road user movement (RUM)	Injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
Overtaking: pulling out	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Overtaking: cutting in	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Overtaking: into right turn	10 0.51 83.33 0.68	2 0.10 16.67 0.42	12 0.62
On path: other	3 0.15 50.00 0.20	3 0.15 50.00 0.63	6 0.31
On path: parked	16 0.82 76.19 1.09	5 0.26 23.81 1.05	21 1.08
On path: accident or breakdown	1 0.05 33.33 0.07	2 0.10 66.67 0.42	3 0.15
On path: open car door	56 2.88 91.80 3.82	5 0.26 8.20 1.05	61 3.14
Off path on straight: off left cway	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Off path on straight: off left cway obj	6 0.31 100.00 0.41	0 0.00 0.00 0.00	6 0.31
Off path on straight: off right cway obj	2 0.10 66.67 0.14	1 0.05 33.33 0.21	3 0.15
Off path on straight: lost control on cway	24 1.23 92.31 1.64	2 0.10 7.69 0.42	26 1.34
Off path on curve: off right bend in obj	0 0.00 0.00 0.00	1 0.05 100.00 0.21	1 0.05
Misc: passenger fell in / from veh	1 0.05 33.33 0.07	2 0.10 66.67 0.42	3 0.15
Misc: load struck veh	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Misc: parked car ran away	1 0.05 100.00 0.07	0 0.00 0.00 0.00	1 0.05
Misc: veh movement unknown	2 0.10 50.00 0.14	2 0.10 50.00 0.42	4 0.21
Total	1466	478	1944

Road user movement (RUM)	Injury severity (N / % / Row % / Column %)		Total
	Injured	Killed or seriously injured	
	75.41	24.59	100.00

APPENDIX 4

SOUTH AUSTRALIAN BICYCLE AND MOTOR VEHICLE CRASH CHARACTERISTICS

ADDITIONAL TABLES

SOUTH AUSTRALIAN CRASHES DURING 2000-2004

Temporal Characteristics

Table A4.1: *Month of crash*

Month of crash	Frequency	Percent
January	180	7.28
February	229	9.26
March	312	12.62
April	222	8.98
May	226	9.14
June	148	5.98
July	183	7.40
August	198	8.01
September	177	7.16
October	194	7.84
November	213	8.61
December	191	7.72

Table A4.2: *Time of crash*

Time of crash	Frequency	Percent
Midnight to 6 am	34	1.37
6 am to 8 am	271	10.96
8 am to 10 am	445	17.99
10 am to midday	224	9.06
Midday to 2 pm	219	8.86
2 pm to 4 pm	367	14.84
4 pm to 6 pm	575	23.25
6 pm to 8 pm	235	9.50
8 pm to midnight	103	4.16

Helmet use

Table A4.3: *Helmet use*

Helmet use	Frequency	Percent
	392	15.85
Worn	1776	71.82
Not worn	143	5.78
Unknown	162	6.55

Accident nature and site features

Table A4.4: *Accident type*

Accident type	Frequency	Percent
Rear end	214	8.65
Hit fixed object	2	0.08
Side swipe	485	19.61
Right angle	1161	46.95
Head on	64	2.59
Roll over	3	0.12
Right turn	299	12.09
Hit parked vehicle	146	5.90
Hit object on road	1	0.04
Left road - out of control	1	0.04
Other	97	3.92

Table A4.5: *Traffic controls*

Traffic controls	Frequency	Percent
Traffic signals	365	14.76
Rail xing - boom	1	0.04
Rail xing - flashing	2	0.08
Stop sign	110	4.45
Give way sign	100	4.04
No control	1734	70.12
Roundabout	157	6.35
Other	4	0.16

Table A4.6: *Other road features*

Other road features	Frequency	Percent
Bridge, culvert, causeway	6	0.24
Road works	7	0.28
Driveway or entrance	166	6.71
Road hump or slow point	18	0.73
Median opening (not at i/s)	9	0.36
Not applicable	2237	90.46
Unknown	30	1.21

Table A4.7: *Road geometry*

Road geometry	Frequency	Percent
Interchange	2	0.08
Cross road	638	25.80
Y-Junction	7	0.28
T-Junction	783	31.66
Multiple	33	1.33
Rail xing	1	0.04
Rail crossing	2	0.08
Divided road	532	21.51
Not divided	412	16.66
One way	2	0.08
Freeway	2	0.08
Pedestrian crossing	4	0.16
Other	55	2.22

Table A4.8: *Speed zone at accident site*

Speed zone at accident site	Frequency	Percent
5 km/hr	1	0.04
6 km/hr	1	0.04
10 km/hr	35	1.42
15 km/hr	2	0.08
20 km/hr	3	0.12
25 km/hr	13	0.53
40 km/hh	33	1.33
50 km/hr	292	11.81
60 km/hr	1937	78.33
70 km/hr	39	1.58
80 km/hr	66	2.67
90 km/hr	12	0.49
100 km/hr	26	1.05
110 km/hr	9	0.36
Not known	4	0.16

Road conditions

Table A4.9: *Road seal*

Road seal	Frequency	Percent
Sealed	2462	99.56
Unsealed	10	0.40
Unknown	1	0.04

Table A4.10: *Road moisture condition*

Road Moisture condition	Frequency	Percent
Wet	153	6.19
Dry	2320	93.81

Table A4.11: *Vertical alignment*

Vertical road alignment	Frequency	Percent
Level	2212	89.45
Crest of hill	20	0.81
Bottom of hill	38	1.54
Slope	198	8.01
Unknown	5	0.20

Table A4.12: *Horizontal road alignment*

Horizontal road alignment	Frequency	Percent
Straight road	2345	94.82
Curved, view obscured	40	1.62
Curved, view open	84	3.40
Unknown	4	0.16

Weather and light conditions

Table A4.13: *Weather*

Weather	Frequency	Percent
Raining	97	3.92
Not raining	2376	96.08

Table A4.14: *Light condition*

Light condition	Frequency	Percent
Daylight	2102	85.00
Dawn/Dusk	95	3.84
Night	276	11.16

Apparent error

Table A4.15: *Responsible entity*

Responsible entity	Frequency	Percent
Driver rider	2451	99.11
Passenger	19	0.77
Other	3	0.12

Table A4.16: *Apparent error*

Apparent error	Frequency	Percent
Excessive speed	1	0.04
Fail to stand	20	0.81
Fail to keep left	34	1.37
Change lanes to endanger	37	1.50
Fail to give way right	10	0.40
Incorrect turn	14	0.57
Follow too closely	22	0.89
Overtake without due care	17	0.69
Disobey - traffic lights	42	1.70
Disobey - stop sign	8	0.32
Disobey - give way sign	19	0.77
Incorrect or no signal	1	0.04
Inattention	241	9.75
No errors	1705	68.94
Other	4	0.16
D.U.I.	15	0.61
Vehicle fault	3	0.12
Died sick or asleep at wheel	1	0.04
Brake failure	1	0.04
Fail to give way	278	11.24

Table A4.17: *Subsidiary error*

Subsidiary error	Frequency	Percent
None identified	2468	99.80
Disobey - traffic lights	1	0.04
Inattention	2	0.08
D.U.I.	2	0.08

APPENDIX 5

BICYCLE AND PEDESTRIAN CRASH CHARACTERISTICS

CRASHES DURING 2000-2004

Colliding pedestrian characteristics

Pedestrian demographics

Sex

Table A5.1: *Pedestrian sex by state*

	Pedestrian sex						Total	
	Unknown		Female		Male			
	N	%	N	%	N	%	N	%
State								
Victoria	5	5.38	61	65.59	27	29.03	93	100.00
Queensland	.	.	37	68.52	17	31.48	54	100.00
Western Australia	1	2.86	20	57.14	14	40.00	35	100.00
South Australia	1	1.08	64	68.82	28	30.11	93	100.00
Total	7	2.55	182	66.18	86	31.27	275	100.00

Table A5.2: *Pedestrian age grouping by state*

	State								Total	
	Victoria		Queensland		Western Australia		South Australia			
	N	%	N	%	N	%	N	%	N	%
Age group										
Unknown	10	10.75	.	.	8	22.86	14	15.05	32	11.64
0-5 years	3	3.23	2	3.70	3	8.57	4	4.30	12	4.36
6-14 years	7	7.53	7	12.96	1	2.86	.	.	15	5.45
15-19 years	5	5.38	1	1.85	3	8.57	6	6.45	15	5.45
20-25 years	7	7.53	2	3.70	.	.	1	1.08	10	3.64
26-29 years	6	6.45	4	7.41	2	5.71	2	2.15	14	5.09
30-39 years	12	12.90	7	12.96	5	14.29	8	8.60	32	11.64
40-49 years	11	11.83	3	5.56	6	17.14	18	19.35	38	13.82
50-59 years	18	19.35	4	7.41	7	20.00	24	25.81	53	19.27
60+ years	14	15.05	24	44.44	.	.	16	17.20	54	19.64
Total	93	100.00	54	100.00	35	100.00	93	100.00	275	100.00

Pedestrian and bicycle rider injury severity

Table A5.3: *Bicyclist injury severity colliding with pedestrians by state*

	Bicyclist injury severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
State						
Victoria	35	81.40	8	18.60	43	100.00
Queensland	14	70.00	6	30.00	20	100.00
Western Australia	5	62.50	3	37.50	8	100.00
South Australia	13	92.86	1	7.14	14	100.00
Total	67	78.82	18	21.18	85	100.00

Table A5.4: *Pedestrian injury severity by bicyclist injury severity*

	Bicyclist injury severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Pedestrian injury severity						
Injured	27	79.41	7	20.59	34	100.00
Killed or seriously injured	21	77.78	6	22.22	27	100.00
Total	48	78.69	13	21.31	61	100.00

APPENDIX 6

BICYCLE AND MOTORCYCLE CRASH CHARACTERISTICS

CRASHES DURING 2000-2004

Colliding motorcycle rider characteristics

Motorcycle rider demographics

Sex

Table A6.1: *Motorcycle rider sex by state*

	Motorcyclist sex						Total	
	Unknown		Female		Male			
	N	%	N	%	N	%	N	%
State								
Victoria	3	8.57	2	5.71	30	85.71	35	100.00
Queensland	5	10.00	1	2.00	44	88.00	50	100.00
Western Australia	1	7.14	.	.	13	92.86	14	100.00
South Australia	2	13.33	2	13.33	11	73.33	15	100.00
Total	11	9.65	5	4.39	98	85.96	114	100.00

Age

Table A6.2: *Motorcyclist age grouping by state*

	State								Total	
	Victoria		Queensland		Western Australia		South Australia			
	N	%	N	%	N	%	N	%	N	%
Age group										
Unknown	5	14.29	6	12.00	2	14.29	3	20.00	16	14.04
6-14 years	.	.	.	.	2	14.29	.	.	2	1.75
15-19 years	3	8.57	1	2.00	3	21.43	1	6.67	8	7.02
20-25 years	1	2.86	14	28.00	4	28.57	4	26.67	23	20.18
26-29 years	7	20.00	6	12.00	2	14.29	1	6.67	16	14.04
30-39 years	3	8.57	6	12.00	1	7.14	1	6.67	11	9.65
40-49 years	8	22.86	11	22.00	.	.	4	26.67	23	20.18
50-59 years	8	22.86	3	6.00	.	.	.	.	11	9.65
60+ years	.	.	3	6.00	.	.	1	6.67	4	3.51
Total	35	100.00	50	100.00	14	100.00	15	100.00	114	100.00

Road user movement

Table A6.3: *Grouped road user movements and definitions for classifying accidents by state*

	N	%
Grouped Definition for classifying accidents	2	2.02
Unknown		
Vehicles from adjacent directions (intersections only)	19	19.19
Vehicles from opposing directions	16	16.16
Vehicles from same direction	22	22.22
Manoeuvring	30	30.30
Overtaking	3	3.03
On path	1	1.01
Off path on straight	6	6.06
Total	99	100.00

Participant injury severity

Table A6.4: *Bicyclist injury severity colliding with motorcyclists by state*

	Bicyclist injury severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
State	17	58.62	12	41.38	29	100.00
Victoria						
Queensland	30	62.50	18	37.50	48	100.00
Western Australia	9	69.23	4	30.77	13	100.00
South Australia	7	63.64	4	36.36	11	100.00
Total	63	62.38	38	37.62	101	100.00

Table A6.5: Motorcyclist injury severity by bicyclist injury severity

	Bicyclist injury severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Motorcyclist injury severity Injured	31	77.50	9	22.50	40	100.00
Killed or seriously injured	3	23.08	10	76.92	13	100.00
Total	34	64.15	19	35.85	53	100.00

Table A6.6: *Bicyclist Injury severity by grouped road user movements and definitions for classifying accidents*

	Injury Severity				Total	
	Injured		Killed or seriously injured			
	N	%	N	%	N	%
Grouped road user movements and definition for classifying accidents .	7	63.64	4	36.36	11	100.00
Vehicles from adjacent directions (intersections only)	12	63.16	7	36.84	19	100.00
Vehicles from opposing directions	12	75.00	4	25.00	16	100.00
Vehicles from same direction	13	65.00	7	35.00	20	100.00
Manoeuvring	17	58.62	12	41.38	29	100.00
Overtaking	2	66.67	1	33.33	3	100.00
On path	.	.	1	100.00	1	100.00
Off path on straight	.	.	2	100.00	2	100.00
Total	63	62.38	38	37.62	101	100.00