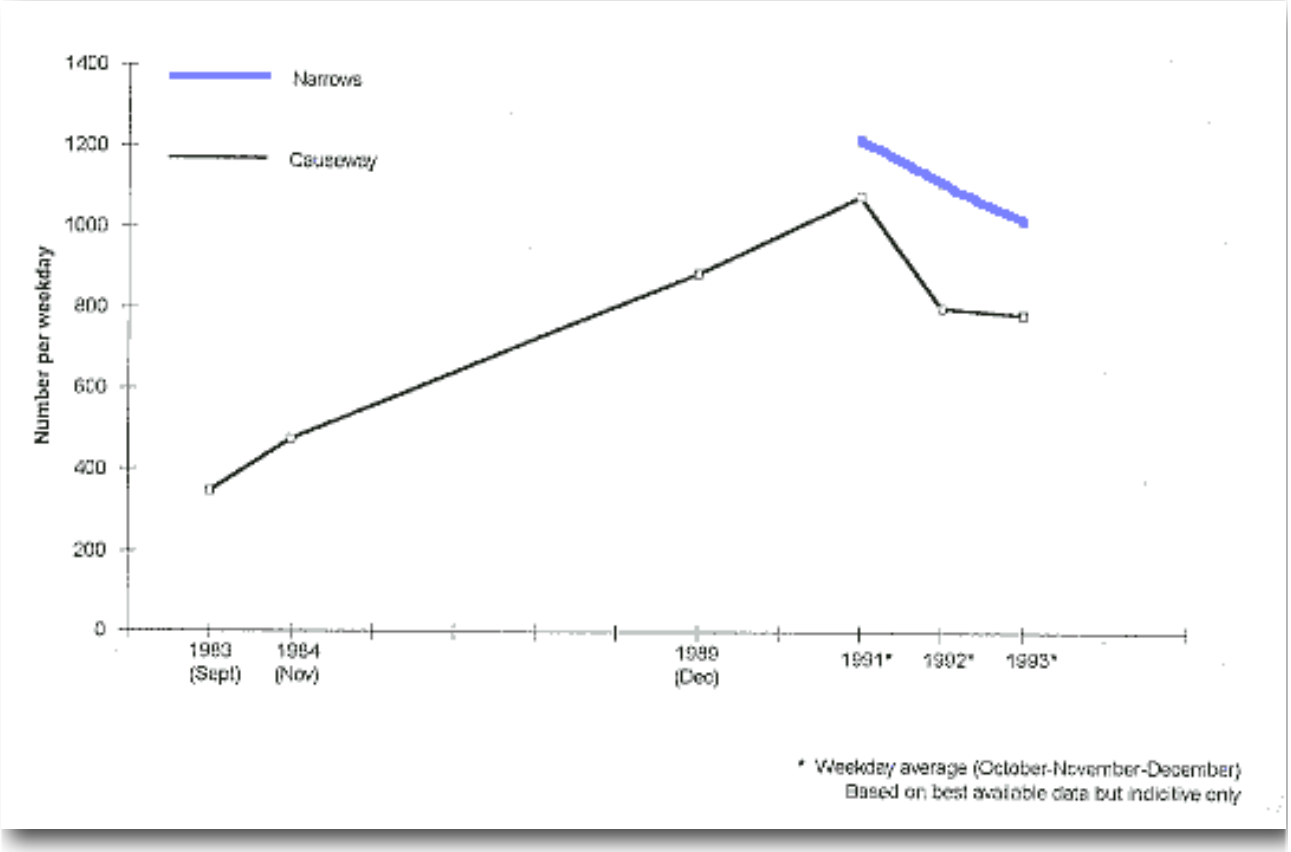
Summary of bicycle helmet law results in Western Australia

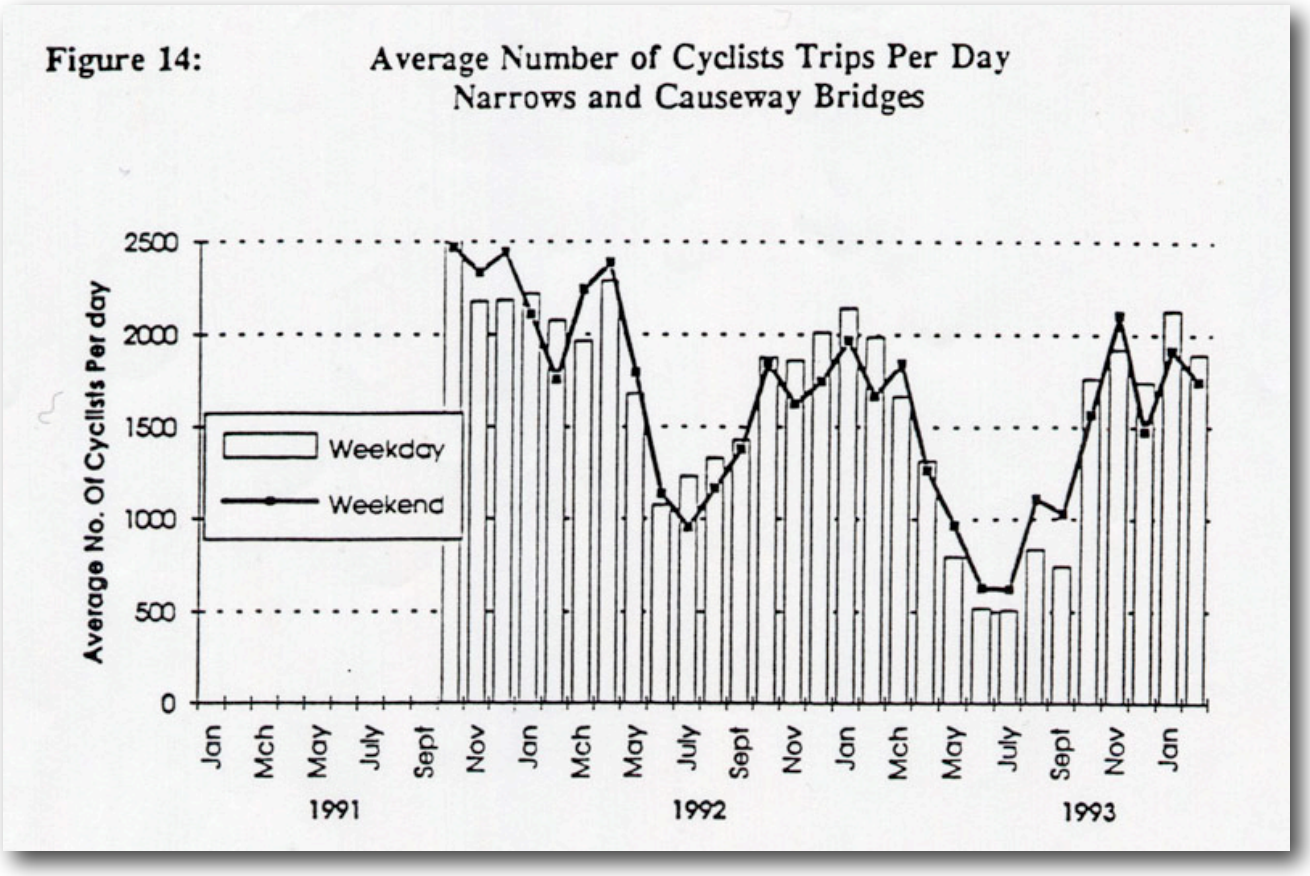
* All graphs, charts and tables presented in this document are scanned directly from reports published by Western Australia government departments, parliamentary commissions of inquiry and/or academic bodies.

How did the 1992 enforcement of a mandatory bicycle helmet law in Western Australia affect cyclist numbers? Main Roads WA official survey counts ...



From 1983 to WA helmet law enforcement in 1992, there was an approximate 10% per annum increase in cyclist numbers at the only survey point in operation in the capital city of Perth. The cyclist number decline was sharp and clearly a result of mandatory helmets.

The enormity of the decline is revealed particularly in the winter months, as illustrated in this graph of cyclist numbers presented by a WA Legislative Council Select Committee of Inquiry into Road Safety, published 1994 ...



Was the discouragement of cycling maintained after 1993? Consider Main Roads WA/ Department of Transport weekday commuter cyclist survey results for the two major survey points combined (Causeway and Narrows river bridges) in the nine months surveyed pre-law compared to the same months in 2005/06:

Oct 91 - 2500 / **Oct 05** - 1740

Nov 91 - 2200 / **Nov 05** - 2327

Dec 91 - 2200 / **Dec 05** - 2148

Jan 92 - 2250 / **Jan 06** - 2493

Feb 92 - 2100 / **Feb 06** - 2527

Mar 92 - 1950 / **Mar 06** - 2579

Apr 92 - 2280 / **Apr 06** - 2266

May 92 - 1700 / **May 06** - 1868

Jun 92 - 1050 / **Jun 06** - 1485

Most commuter cyclists will wear lycra and helmets regardless of the law. How about recreational cyclists who want to peddle to the shops, beach, friend's place or just for fun?

MRD

TPLE

PEDESTRIAN/BICYCLE CONFLICTS ON DUAL USE PATHS

1. The issues raised by the MLA for South Perth in the attached extract from Hansard reflect a growing problem on the Dual Use Path [DUP] system around Perth, namely that of pedestrian- bicycle conflict. As indicated in the Hansard extract a Working Party was set up in November 1988 to look at the problems associated with DUPs.

2. Working Party on Cycling on Paths

2.1. The Working Party on Cycling on Paths has had a MRD officer in attentance at every meeting. The Bicycle Studies Coordinator attended the last meeting in June 1989.

2.2. The abovementioned working party commissioned research into conflicts occurring on Dual Use Paths. This resulted in a report completed by two Dutch students which details a cross-section of the conflicts occurring at selected locations.

This report, while not quantifying the pedestrian/cyclist conflict or detailing "black-spots", has shown that speed and path geometry are problems at the Narrows Bridge and Causeway Bridges and approaches. This is of particular interest to the Department as these locations have the highest volumes of bicycle traffic recorded in Perth and are clearly within MRD jurisdiction. There is currently $40 000 on the Traffic Directorate Minor Works Program to improve path geometry and features. This is part of the DTM Planning Group's program to address "black-spots" within existing bicycle facilities.

2.3. Bikewest is currently working on an interim report outlining a strategy for further work in allieviating DUP conflict problems.

3. Bicycle Traffic Volumes

3.1. Bicycle Growth

Recent bicycle traffic counts show a large growth in bicycle traffic as indicated at the following locations.

Location	Type	Sept 83	Nov 84	Aug 89	Dec 89	Growth
Causeway	weekday count		475		888	13.1%
	weekday count	347		739		13.8%
			Average Weekday Growth			13.5%
Causeway	weekend count		887		1268	7.3%
	weekend count	812		1253		9.1%
Narrows Bridge	weekend count		1047	1763		11.4%
			Average Weekend Growth			9.2%

TABLE 1 : DUP BICYCLE TRAFFIC GROWTH PERTH CBD
[Based on 12 Hour 2-way Counts]

Above is a Main Roads WA document showing average daily weekend cyclist numbers on the Narrows Bridge in August 1989 - three years before the law was enforced. The average was 1,763.

Twenty years later and according to the Department of Transport database accessible on the web, the combined east and west cycle path weekend daily count in August 2009 was 1,590.

How about the Causeway bridge, the only other location in Perth with official pre-law survey data? The Main Roads WA document shows that in December 1989, the average weekend cyclist count on the Causeway bridge alone was 1,268.

The Department of Transport survey database shows the combined average weekend cyclist count on the Causeway and Windan bridges combined in December 2009 was 1,400. The Windan Bridge was opened in 2000 about two kilometres upstream from the Causeway, potentially draining cyclists as these are river bridges with no alternative crossings.

Weekday commuter cycling has had an insipid recovery and 20 years after law enforcement is two to three times the pre-law numbers. As reflected in the weekend cyclist numbers on the bridges, leisurely recreational cycling remains damaged more than 20 years after the 1989 surveys, despite Perth population growth of 44% from 1991 to 2009 and inner city residential populations near the bridges more than doubling.

Australian Bureau of Statistics data on weekday commuter cycling:

Australia

Census Year	Percentage cycling all the way to work	
1976	1.11%	
1981	1.47%	
1986	1.63%	(no law)
1991	1.63%	(law enforced in some states)
1996	1.21%	(law enforced in all Australian states)
2001	1.15%	

Perth (law enforced in 1992, six months after 1991 Census)

Census Year	Percentage cycling all the way to work
1976	0.92%
1981	1.16%
1986	1.37%
1991	1.68%
1996	1.11%
2001	1.12%

Sydney (law enforced more than six months before 1991 Census)

Census Year	Percentage cycling all the way to work
1976	0.36%
1981	0.63%
1986	0.66%
1991	0.74%
1996	0.61%
2001	0.60%

The long-term damage caused by helmet laws is further reflected in the failure of bike share schemes in Melbourne and Brisbane in 2010, compared to the consistent success of such schemes in voluntary helmet jurisdictions across the globe since 2008.
See http://www.cycle-helmets.com/bike-hire-schemes.html

So there is abundant pre and post law data in Western Australia to confirm that cycling popularity declined substantially, particularly among recreational cyclists. With this significant downturn in cyclist numbers, and with helmet wearing rates soaring to more than 80% after law enforcement, what happened to cyclist injury numbers - as represented by WA hospital cyclist admissions?

1985 - 623

1986 - 660

1987 - 630

1988 - 698

1989 - 596

1990 - 638

1991 - 730

1992 - 574

1993 - 633

1994 - 644

1995 - 660

1996 - 715

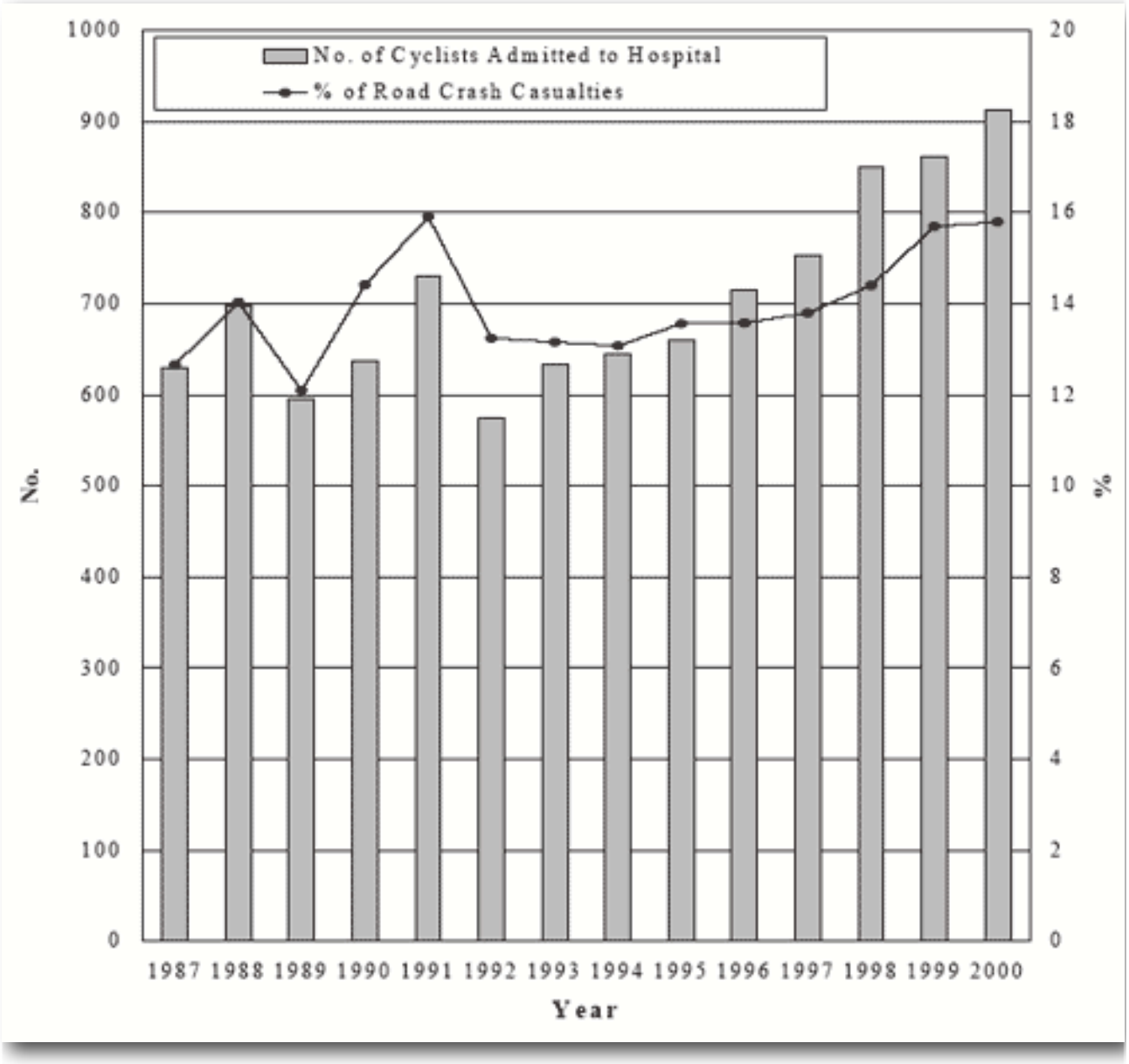
1997 - 754

1998 - 850

1999 - 862

2000 - 913

The WA cyclist injury trend is graphed in Road Safety report RR131 commissioned by Road Safety Council, dated November 2003:



Alarm bells should be ringing.

Pre and post helmet law data from the WA Health Department supports other research evidence that head injury rates had been falling before law enforcement:

Site	Injury[1]	1981-1983	1984-1986	1987-1989	1990-1992	1993-1995	Total
Head							
	Skull fractures	3.4	5.6	4.7	3.4	2.3	3.9
	Facial	6.9	9.1	11.6	11.5	10.6	10.0
	Intracranial	38.0	35.3	27.1	22.3	21.2	28.6
	Other head	1.1	1.2	1.7	1.5	0.9	1.3
	Total	49.5	51.2	45.2	38.7	35.0	43.7
Non-Head							
	Spinal	0.2	0.4	0.6	1.3	1.0	0.7
	Lower limb fractures	11.1	10.1	11.2	11.0	10.4	10.8
	Upper limb fractures	15.7	14.7	16.4	22.9	28.6	19.8
	All other fractures[2]	0.7	0.9	1.1	1.5	1.5	1.2
	Dislocations/ sprains	1.1	1.2	1.4	1.8	1.9	1.5
	Superficial	13.2	13.8	15.7	14.8	13.1	14.1
	Internal	2.9	2.2	2.2	2.4	2.3	2.4
	Other	5.5	5.5	6.2	5.7	6.2	5.8
	Total	50.5	48.8	54.8	61.3	65.0	56.3

The WA Health Department table above shows the percentage of hospitalisations for injuries sustained in cycling crashes by site and nature of injury in Western Australia from 1981-1995. The percentage of overall head injuries had been falling since 1984 - eight years before law enforcement. Intracranial injuries in particular had been falling since 1981 but levelled off after the law was enacted. Take note of the upper body injury percentages.

How about the real numbers instead of percentages?

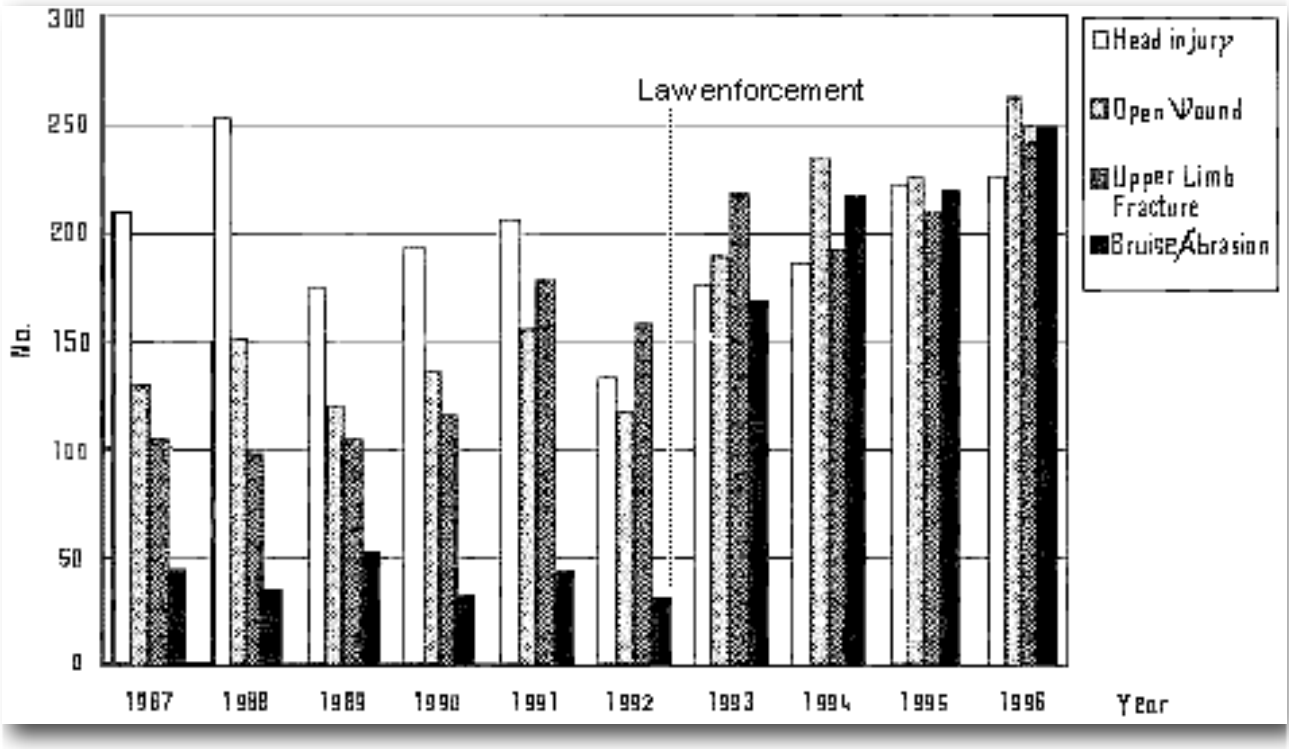
Injury *	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Head	222 (31.8%)	148 (24.8%)	163 (25.5%)	177 (24.2%)	116 (20.2%)	143 (22.6%)	126 (19.6%)	160 (24.2%)	147 (20.6%)	141 (18.7%)	175 (20.6%)
Upper Extremities	118 (16.9%)	133 (22.3%)	139 (21.8%)	206 (28.2%)	177 (30.8%)	216 (34.1%)	193 (30.0%)	199 (30.2%)	226 (31.6%)	274 (36.3%)	274 (32.2%)
External	133 (19.1%)	134 (22.5%)	121 (19.0%)	140 (19.2%)	91 (15.9%)	99 (15.6%)	103 (16.0%)	107 (16.2%)	114 (15.9%)	88 (11.7%)	90 (10.6%)
Lower Extremities	96 (13.8%)	91 (15.3%)	87 (13.6%)	99 (13.6%)	92 (16.0%)	87 (13.7%)	98 (15.2%)	88 (13.3%)	122 (17.1%)	107 (14.2%)	118 (13.9%)
Face	49 (7.0%)	33 (5.5%)	41 (6.4%)	41 (5.6%)	48 (8.4%)	39 (6.2%)	55 (8.5%)	48 (7.3%)	56 (7.8%)	40 (5.3%)	49 (5.8%)
Abdomen	22 (3.2%)	16 (2.7%)	19 (3.0%)	19 (2.6%)	11 (1.9%)	14 (2.2%)	19 (3.0%)	13 (2.0%)	11 (1.5%)	24 (3.2%)	25 (2.9%)
Spine	10 (1.4%)	3 (0.5%)	15 (2.4%)	14 (1.9%)	7 (1.2%)	8 (1.3%)	16 (2.5%)	7 (1.1%)	16 (2.2%)	11 (1.5%)	15 (1.8%)
Chest	5 (0.7%)	8 (1.3%)	13 (2.0%)	6 (0.8%)	13 (2.3%)	10 (1.6%)	16 (2.5%)	17 (2.6%)	13 (1.8%)	14 (1.9%)	10 (1.2%)
No Injury	43 (6.2%)	30 (5.0%)	40 (6.3%)	28 (3.8%)	19 (3.3%)	17 (2.7%)	18 (2.8%)	21 (3.2%)	10 (1.4%)	55 (7.3%)	94 (11.1%)
Total	698 (100%)	596 (100%)	638 (100%)	730 (100%)	574 (100%)	633 (100%)	644 (100%)	660 (100%)	715 (100%)	754 (100%)	850 (100%)

The table above is extracted from Bicycle Crashes and Injuries in Western Australia, 1987-2000 - Road Safety report RR131 commissioned by the WA Road Safety Council in 2003.

The actual number of skull fractures was 64 in 1990-1992 and 44 in 1993-1995 (-31.25%). The actual number of intracranial injuries was 423 in 1990-1992 and 403 in 1993-1995 (-4.8%). The decline in skull fractures in the three years after helmet law enforcement amounts to an average seven per year. The decline in intracranial injuries in the three years after helmet law enforcement also amounts to an average seven per year. That's an average 14 less head injuries per year.

But what about those upper body injury percentages noted above? Cyclist upper extremity injuries in Western Australia increased from 118 (16.9% of all injury locations) in 1988 to 274 (32.2%) in 1998. That's an increase in numbers, not percentages, largely explaining the increase in overall WA hospital admissions despite the reduced number of cyclists and most wearing helmets.

The increase in cyclist injuries/hospital admissions is starkly illustrated in the graph below extracted from Bicycle Crashes and Injuries in Western Australia - Road Safety report RR60 commissioned by Main Roads WA, RoadWatch and the University of Western Australia, dated March 1998.

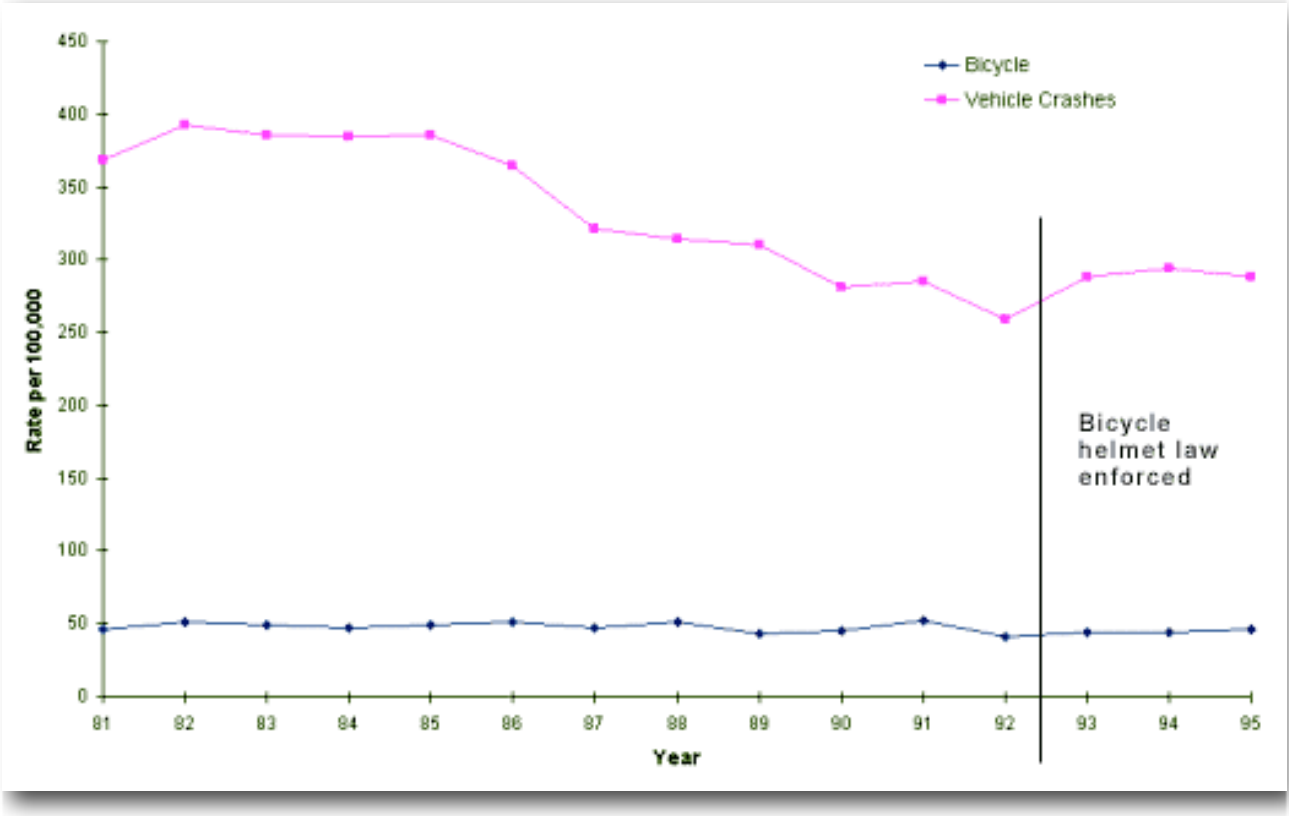


Surely the government figures shows a big reduction in head injury severity thanks to mandatory helmets?

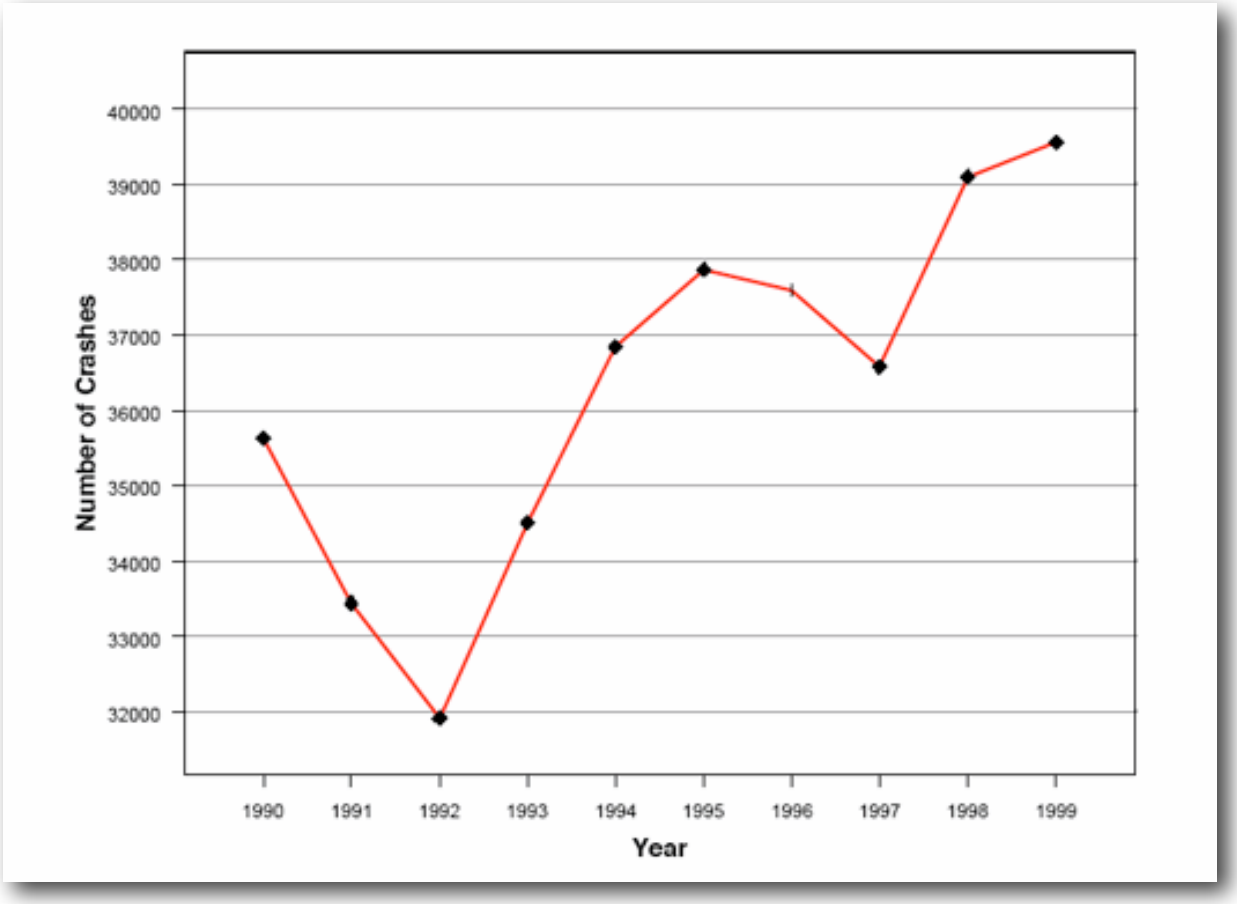
	Period				
Injury[2]	1981-1983	1984-1986	1987-1989	1990-1992	1993-1995
Skull fractures	13.1	7.9	7.6	8.4	11.0
Facial	3.6	2.6	2.8	2.4	1.8
Intracranial	2.3	3.0	2.5	2.1	2.2
Other head	2.3	2.0	2.1	2.5	2.6
Spinal[3]	120.0	24.1	38.0	14.7	15.1
Lower limb fractures	12.3	13.5	12.1	9.1	8.0
Upper limb fractures	2.7	2.5	2.4	2.0	1.6
All other fractures[4]	13.9	10.8	12.4	11.8	6.7
Dislocations/sprains	2.8	2.5	4.1	3.7	2.5
Superficial	4.8	4.1	4.8	3.6	3.0
Internal	16.3	8.6	8.5	5.6	6.4
Other	4.7	6.3	5.1	4.6	2.5

The table above shows WA Health Department data on the average length of hospital stay by nature of injury from 1981 to 1995. It appears that mandatory helmets reduced injury severity to all areas of the body except the head.

WA government data also reveals a hidden cost from mandatory bicycle helmet laws - the increase in overall WA road casualties caused by the tens of thousands of discouraged cyclists who chose to drive their cars instead.



Above is a West Australian Health Department graph comparing hospital admissions for injuries sustained in bicycle and vehicle crashes from 1981 to 1995.



The chart above shows the total number of reported road crashes in Western Australia by year, sourced to the Main Roads WA Traffic Accident System.

	Crash Severity								
	Fatal		Hospitalisation		Total Serious		Other		Total
Year	n	(%)*	n	(%)*	n	(%)*	n	(%)*	n
1990	181	(0.5)	2,116	(5.9)	2,297	(6.4)	33,334	(93.6)	35,631
1991	186	(0.6)	2,013	(6.0)	2,199	(6.6)	31,245	(93.4)	33,444
1992	171	(0.5)	1,967	(6.2)	2,138	(6.7)	29,781	(93.3)	31,919
1993	190	(0.6)	1,999	(5.8)	2,189	(6.3)	32,322	(93.7)	34,511
1994	195	(0.5)	2,033	(5.5)	2,228	(6.0)	34,618	(94.0)	36,846
1995	194	(0.5)	2,275	(6.0)	2,469	(6.5)	35,408	(93.5)	37,877
1996	220	(0.6)	2,043	(5.4)	2,263	(6.0)	35,331	(94.0)	37,594
1997	184	(0.5)	2,222	(6.1)	2,406	(6.6)	34,176	(93.4)	36,582
1998	199	(0.5)	2,268	(5.8)	2,467	(6.3)	36,642	(93.7)	39,109
1999	189	(0.5)	1,880	(4.8)	2,069	(5.2)	37,498	(94.8)	39,567
Total	1,909	(0.5)	20,816	(5.7)	22,725	(6.3)	340,355	(93.7)	363,080

The table above provides the actual number of reported road crashes in Western Australia by year and crash severity, sourced to the Main Roads WA Traffic Accident System. There were 2,592 more road casualties in 1993 than in 1992, the year mandatory helmets discouraged cyclists, and the numbers have worsened ever since. The casualty increase included fatalities.

The same reversal in road safety is evident in road crash casualty figures across Australia, published by the Australian Transport Safety Bureau:

1980 - 32,054
1981 - 32,108
1982 - 30,654
1983 - 28,080
1984 - 28,795
1985 - 29,248
1986 - 29,169
1987 - 29,698
1988 - 29,705
1989 - 28,483
1990 - 24,961
1991 - 22,528
1992 - 21,512
1993 - 21,557
1994 - 22,133
1995 - 22,368
1996 - 21,989
1997 - n/a
1998 - n/a
1999 - n/a
2000 - 26,963
2001 - 27,471
2002 - 27,934
2003 - 28,422
2004 - 28,864
2005 - 30,574

Apart from mandatory helmet law enforcement, what happened in 1992 to reverse a decade-long decline in car crashes and overall road casualties?

See http://www.cycle-helmets.com for more detail.