

Inquiry on Personal Choice and Community Safety

***Bicycle Helmet Laws decrease community safety & health
as well as denying personal choice***

Dr Dorothy L Robinson, Cycle-Safe

***Please find attached a submission by Cycle-Safe for the Inquiry on Personal Choice and
Community Safety.***

Yours sincerely

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Summary

Banning non-helmeted cycling

1) damages public health by discouraging cycling. In the UK, where cyclists do not have to wear helmets, commuter cyclists had a 41% lower death rate than non-active (driving or public transport) commuters [1]. Depriving Australians of such substantial health benefits by discouraging healthy, environmentally-friendly, low-cost transport does not make sense.

2) increases injury rates to remaining cyclists because of risk compensation and reduced safety in numbers [2]. **The substantial health benefits of cycling** were demonstrated by a study of 263,450 subjects in the UK (published in the British Medical Journal) showing that those who ***did not cycle to work*** had a ***69% increased risk of death*** than those who did. As well as being 41% less likely to die overall, cycle commuters had a 52% lower risk of dying from heart disease and a 45% lower risk of cancer [1].

Evidence that helmet laws reduce cycling. This submission cites a large body of evidence showing that the most obvious consequence of Australia's helmet laws was a substantial reduction in cycling, and consequent damage to public health. Evidence of continued discouragement includes the fact that helmets were cited as the main barrier to using the Melbourne Bike Scheme [3]. Helmet laws increase the perception that cycling is unsafe. If people who don't like helmets are convinced it's far too dangerous to cycle without a helmet, safety concerns might be the first thing to come to mind when asked why they don't cycle, rather than helmet laws.

Queensland Parliamentary Committee Inquiry not convinced that helmet laws are justified

Bicycle helmet laws were reviewed in a Queensland Parliamentary Committee Inquiry (number 39) in November 2013 – see <http://www.parliament.qld.gov.au/documents/committees/thlgc/2013/inqyc/rp-39-29nov13.pdf> *“The Committee is therefore of the view that relaxing mandatory helmet laws in specific circumstance is likely to increase cycling participation rates with a range of associated health benefits and economic benefits in tourism areas. The Committee also believes that a relaxation of mandatory helmet laws may assist in normalising the perception of cyclists by motorists.”*

Bicycle network review – survey and expert opinions

The Bicycle Network is reviewing helmet laws. The review (not yet finalized) included a survey of 20,000 people that found *nearly two-thirds don't believe you should have to wear a helmet every time you ride a bike in Australia.*

Experts and medical professionals were also consulted. In total, 32 expert reports were provided, of which 28 were made public. The vast majority – 78% – stated that they did not support helmet laws. One researcher thought the evidence insufficient to draw a firm conclusion; only 29% supported compulsory helmets [4].

As part of the discussion of why this issue needs to be reviewed, Bicycle Network's CEO wrote: *“I've also been given a stern warning from high places that if I even consider reviewing helmet laws, Bicycle Network will no longer be seen as an organisation with credibility”* [4]. This suggests that an unwillingness to review the evidence, coupled with closed minds and political expediency in high places, might be one reason why cycling is flourishing and becoming much safer in countries such as Ireland, Denmark and Holland where helmets are optional (as demonstrated by this submission), but Australia's road safety strategies are failing, especially for cyclists [5].

Australian Senate Inquiry: Personal Choice & Community Impacts

The Australian Senate Inquiry recommended developing a nationally consistent dataset to shed more light on the extent to which helmet laws have discouraged cycling, as well as related effects such as reduced safety in numbers and risk compensation.

Evidence has, since then, mounted on the considerable improvements in cyclist safety in other countries where cycling is increasing, due in part to the increasing popularity of City Bike schemes (as outlined in this submission) for Dublin, New York and elsewhere.

Additional analyses on the effect of bicycle helmet laws in NSW were published in 2018 by the Transport and Road Safety Research Centre, University of NSW. These new analyses reported decreases in injuries and fatalities of cyclists that were attributed to reduced cycling (especially for cyclists aged 0-20), safer roads conditions (road fatalities per 100,000 population in NSW dropped by 47% from 18.2 to 9.7 from 1988-1993) and increased use of bicycle paths and off-road facilities. The author concluded: *“the factors mentioned above are able to explain most*

or all of the observed reductions in fatalities and provide a better explanation of the pattern of those reductions than mandatory helmet legislation”[6].

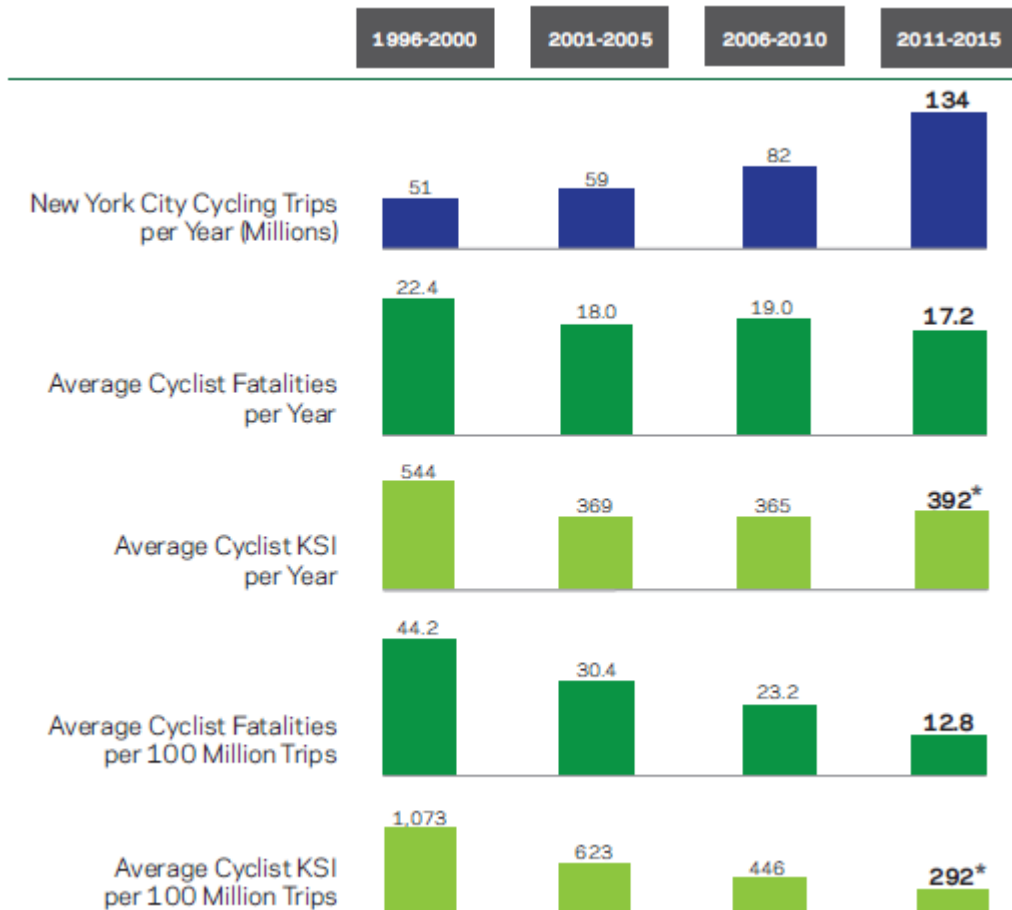
A study of Canadian helmet laws reached similar conclusions. Legislation increased helmet wearing rates, but that did not translate into fewer head injuries. Study author Prof. Kay Teschke said: “Helmet laws didn’t make a difference to hospitalization rates for head and brain injuries”. She said the study yielded other surprises including that the rate of hospitalization amongst cyclists actually dropped as the rate of cycling went up. “This may be a result of motorist and cyclist getting used to each other as rates of cycling increase, and also a reflection of better and safer cycling infrastructure enticing more people to get on their bikes” [7].

Mexico City and Israel repealed helmet laws because of the difficulties they create for bike-share schemes. Tel Aviv was rewarded by a 54% increase in numbers of residents cycling to work or school from 2010 to 2012 [8]. Enforcement of helmet laws in Vancouver is virtually non-existent, having fallen from 2,828 tickets issued in 2009 to 17 in 2016 and 35 in 2017 [9]. Non-compliance with the law appears widespread [10, 11]. Given the strong evidence that helmet laws discourage cycling, damage health and reduce safety in numbers, it’s time for Australia to make cycling safer and more popular by following suit and repealing helmet laws.

Detailed Submission

A substantial body of evidence shows that helmet laws discourage cycling. The lost health and environmental benefits from reduced cycling (compared to what would be expected without the law), and the increased injury rates because of reduced safety in numbers, are much larger than any possible benefits of increased helmet wearing.

Helmet laws also reduce the viability of Bike-Share Schemes resulting in lost health, safety and environmental benefits. Public bike-share schemes are making cycling safer and more popular in many cities. Velib drove **Paris** ‘cycling mad’[12]. The bike-share scheme in **New York** commenced in May 2013. A total of 8.2 million bike-share trips were made in the first year of operation, yet deaths and serious injuries in the bike-share zone fell by 17% [13]. The graphic below (from Safer Cycling: Bicycle Ridership and Safety in New York City [13]) shows major safety benefits when cycling increased in the Big Apple.



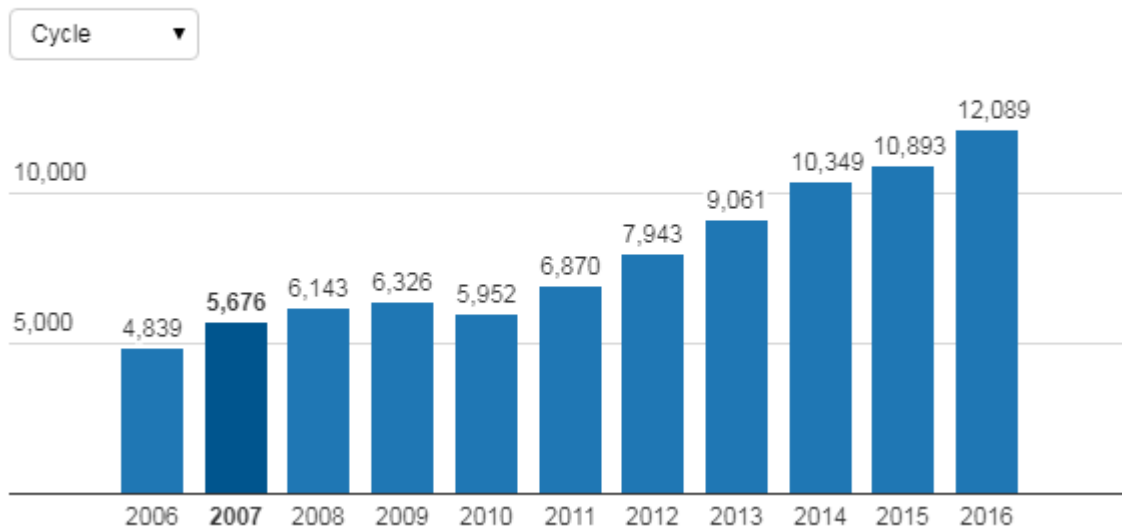
Dublin launched a bike-share scheme in 2009 with 450 bikes and 40 stations. There were over 2,200 trips per bike (more than 6 trips per bike per day) in its first year [14]. The scheme was noted to be very safe with no reported injuries in the first 10 months and only one bike going missing. Contrast this with 0.5-1.0 trips per day for Melbourne’s bike-share scheme in 2011-2013.

In the Dublin Regional Authority in 2006 (before the bike-share scheme), census data show that 3.8% cycled to work. By 2011, 5.0% cycled to work, increasing to 6.7% in 2016. Census data for Dublin City show even better results: 7.7% cycling to work in 2011, increasing to a massive (by Australian standards) 10.3% in 2016. Cycling to school, college or university in Dublin City also increased from 7.3% (13-18 years) and 9.6% (aged 19+) in 2011 to 8.6% and 13.9% in 2016.

In November (a dark and dreary time of year for cycling) annual traffic counts are held on 33 routes accessing Dublin through a cordon roughly defined by the Royal and Grand canals. Counts of cyclists entering the city between 7 and 10 am show a dramatic increase, peaking at over 12,000 in 2016 [15].

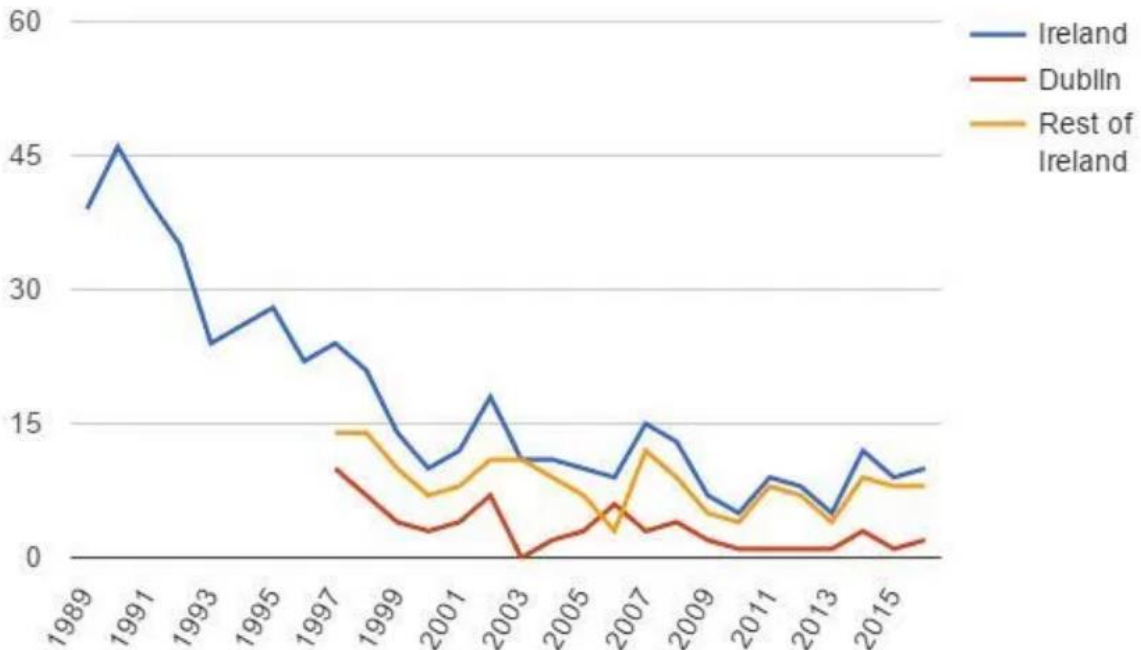
Figure: Bicycle Counts in Dublin (Irish Times [15])

The total numbers of vehicles, pedestrians and cyclists crossing the Canal Cordon inbound between 0700-1000 from 2006-2016.



Despite the increases in cycling, road deaths to cyclists in Dublin have not increased, implying that cycling has become safer as well as more popular.

Cyclist deaths and injuries on Irish roads (source: Irish Cycle [16])



Melbourne. In a survey about Melbourne Bike-Share (MBS), 61% of respondents identified helmets as the main barrier to using the scheme [3]. Another survey had online (n = 602) and intercept polling (n = 2945). An open text field allowed respondents to comment on the bike-share scheme; 46% cited mandatory helmet legislation as having a negative impact [3]. This probably explains the relatively low usage of Melbourne and Brisbane’s bike-share schemes compared to a selection of other cities (see graph below).

Melbourne & Brisbane: bike-share usage compared to some other cities (source: Fishman [17])

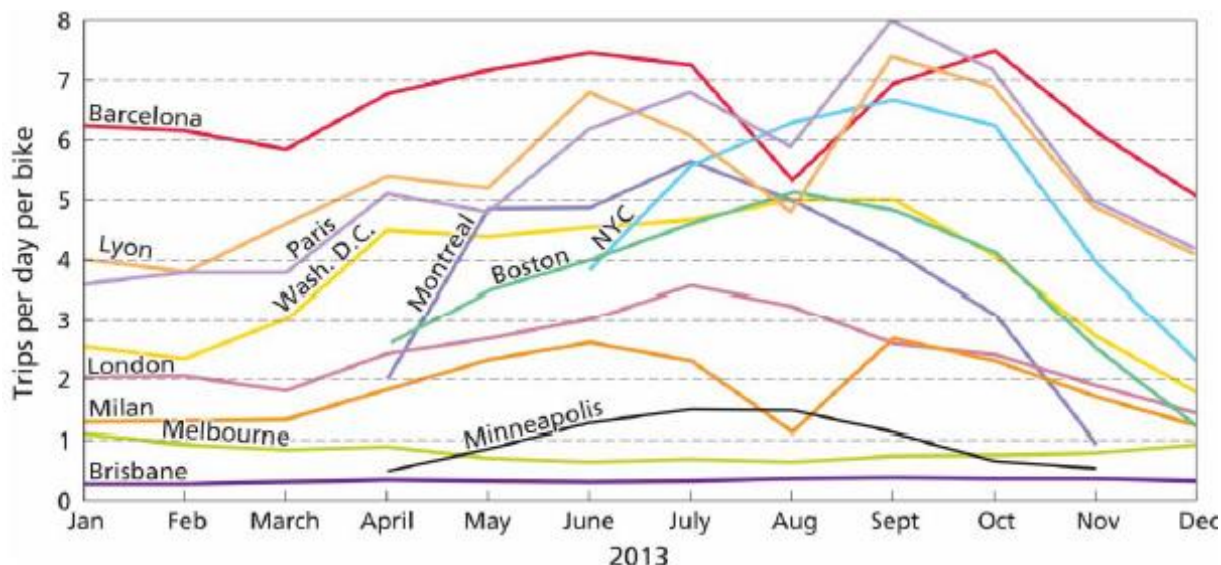


Figure 3. Bikeshare usage, trips per day, per bike, 2013.

Note: Montreal and Minneapolis, owing to their harsh winters, are closed during the coldest months of the year.

Mexico City and Israel repealed helmet laws to increase the chances of successful bike-share schemes. Tel Aviv was rewarded by a 54% increase from 2010 to 2012 in numbers of residents cycling to work or school [8].

An evaluation of **Barcelona’s** bike-share scheme concluded that the expected 0.03 deaths per year from traffic incidents represents only a tiny fraction of the 12.46 deaths avoided by increased physical activity [18]. Other benefits included a reduction of 9,062 tonnes in annual CO₂ emissions [18].

North America. Prof Kay Teschke collated statistics on cycling to work in four North American cities that introduced bike-share schemes, compared to five that did not. The results suggest a substantially greater increase in bicycle commuting in cities that introduced bike-share schemes.

	Proportion of Commuters Who Travel by Bicycle†		% Change in Bicycle Commuting
	Pre-implementation	Post-Implementation	
PBSP Cities*			
Montreal	2.4%	3.2%	+33%
Washington DC	2.3%	3.2%	+39%
Minneapolis	3.5%	4.5%	+30%
Boston	1.6%	2.0%	+29%
Control Cities			
Vancouver	3.7%	4.4%	+19%
Seattle	3.6%	4.1%	+14%
New York	0.6%	0.8%	+33%
Milwaukee	0.75%	0.9%	+13%
Los Angeles	0.95%	1.0%	+11%

† American cities, data from pre- and post-implementation years; Canadian cities, from census years 2006 and 2011

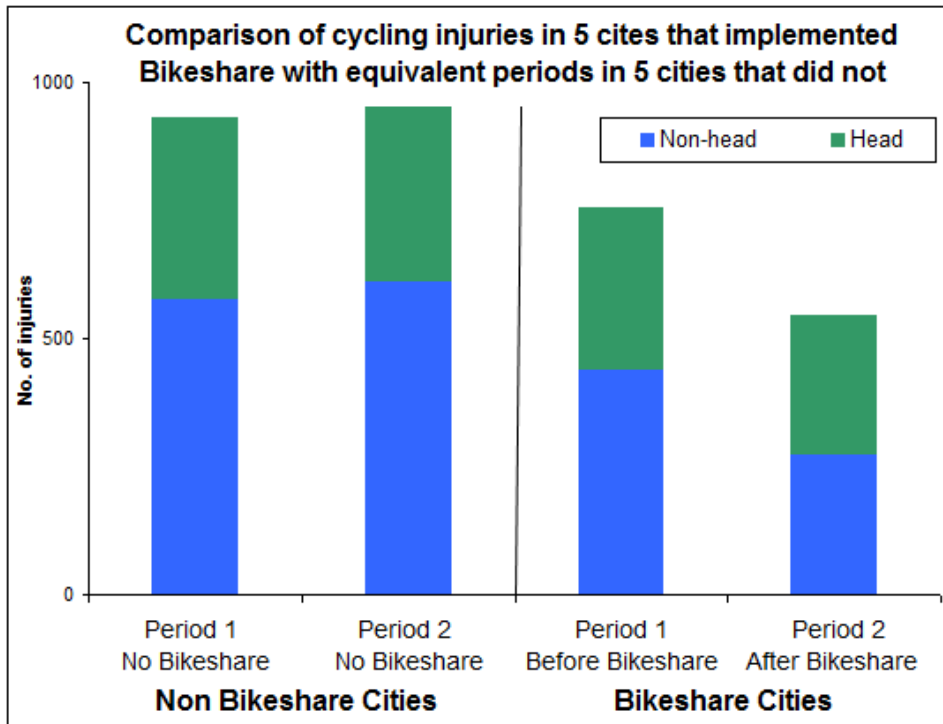
* Data not available for Miami Beach

Injury data for the above cities were collated for a research paper by Janessa M. Graves who found that, after bike-share schemes, head injuries increased as a proportion of total cyclist injuries, leading to the recommendation that steps should be taken to make helmets available for bike-share users [19].

Yet the total numbers of injuries *decreased* in bike-share cities – see graph below. As in New York and Dublin, despite increased cycling in the bike-share cities, injuries per cyclist (and in this case total

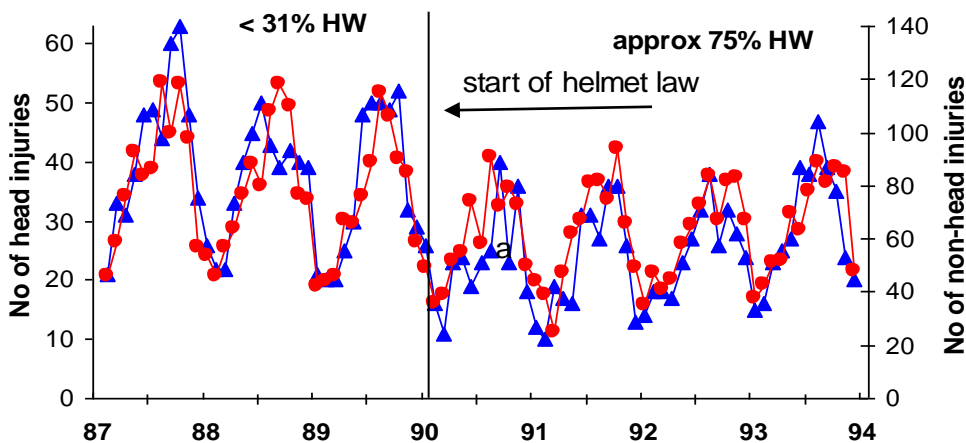
numbers of injuries) decreased.

This is another example where advocates promoting helmets and helmet laws seem to focus only on part of the picture and ignore factors that have much greater benefits than helmets, without the drawbacks of helmet laws such as risk compensation, reduced cycling and reduced safety in numbers.



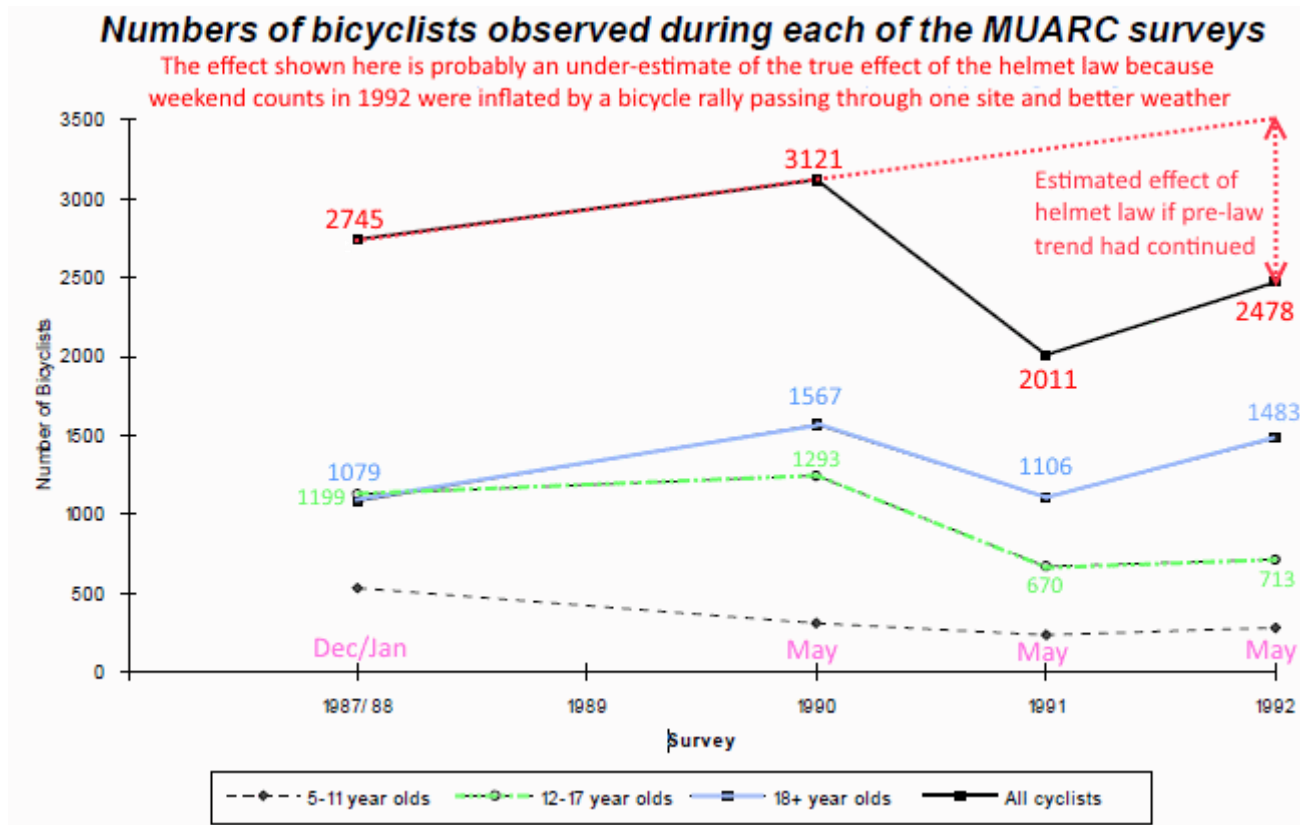
Canadian Helmet Laws. Many helmet law evaluations failed to consider the trends in injury rates that were present before helmet laws were enacted. One exception was an evaluation of helmet laws in Canada; it was unable to detect any independent effect of legislation on the rate of hospital admissions for cycling-related head injuries [20]. Another Canadian study evaluated the impact of several factors including helmet legislation on cyclist hospitalization rates. Females had lower hospitalisation rates than males. For traffic-related injuries, higher cycling mode share was consistently associated with lower hospitalisation rates, suggesting a ‘safety in numbers effect’. Helmet legislation was not associated with reduced hospitalisation rates for brain, head, scalp, skull or face injuries, indicating that factors other than helmet laws have a greater influence on injury rates. This suggests that helmet laws may distract attention away from more important safety factors and so are likely to be counter-productive.

Australian Helmet Laws. The graph below shows monthly totals of cyclists with and without head injury who were admitted to public hospitals in Victoria [21]. Two factors stand out immediately:
 1) Injuries follow a seasonal pattern, peaking from December-March with lowest numbers in July.
 2) Both head and *non-head* injuries declined with the introduction of the helmet law. Helmets do not prevent non-head injuries, so the most likely explanation is that the law discouraged cycling.



The effect of the helmet law in reducing young people’s cycling in Melbourne was confirmed by Cameron et al. (1994): “Bicycle use among teenagers decreased by 43% by 1991 and by 46% by 1992, relative to 1990. Bicycle use by children aged 5-11 also decreased over the same period - by 3% in 1991 and 11% in 1992, compared to 1990. Because the 1990 survey did not cover adult bicyclists, it was not possible to fully examine the change in their bicycle use”. [22].

Despite the claim of Cameron et al. (1994) that the 1990 survey did not cover adult cyclists, they were counted in the 1990 survey [23]. As shown in the graph below (adapted from Finch et al. 1993 [23]), counts of adult cyclists fell by 29% from 1567 in 1990 to 1106 at the same 64 sites and observation times. This strongly suggests that the law had a significant effect in deterring adult cyclists as well as children. Counts of adults in the 1992 survey were 5% below those in 1990, but a report notes that in 1992 counts were inflated by a bicycle rally passing through one of the sites and better weekend weather in 1992 than 1991 or 1990 [23].



As well the time of year differences, average cycling speeds in the Dec-Jan 87/88 survey were much faster than in May 1990, 1991 or 1992, suggesting that there is no valid way to estimate the effect of the helmet law by comparing surveys in Dec/Jan with those in May. This was confirmed by contrasting the official estimate of the effect of the law on teenage cycling (using May 1990 pre-law data) with results from comparing the Dec-Jan 87/88 survey with the post-law surveys in 1991 and 1992. Instead of the correct 44% reduction reported by Finch et al. [23], the technique of extrapolating from Dec-Jan 87/88 to the May 1990 and 1991 surveys (used by Cameron et al. to claim that adult cycling increased) would have led to the totally invalid conclusion that the law had very little or no effect on teenage cycling!

The graph above (based on the MUARC report by Finch et al. [23]) indicates that numbers of cyclists counted (which are highly correlated with cycle use) provide a much better estimate of the effect of the law. For teenagers, the 48% reduction in numbers counted is very similar to the MUARC estimate of a 44% reduction in cycle use. As shown above, counts of adult cyclists increased substantially from 1079 in Dec-Jan 87/88 to 1567 in May 1990. The decline after the helmet law follows a very similar pattern for both adults and teenagers. It therefore seems highly likely that the 29% reduction in counts of adult cyclists is a pretty good indicator of the effect of the law on adult cycling [24].

Surprisingly, as well as stating in the text that the 1990 survey did not cover adult cyclists (although adult cyclists were in fact counted) the abstract of Cameron et al. (1994) states there was: “an estimated increase in adult use of 44%.” Given the high correlation between counts and cycle use, and that numbers

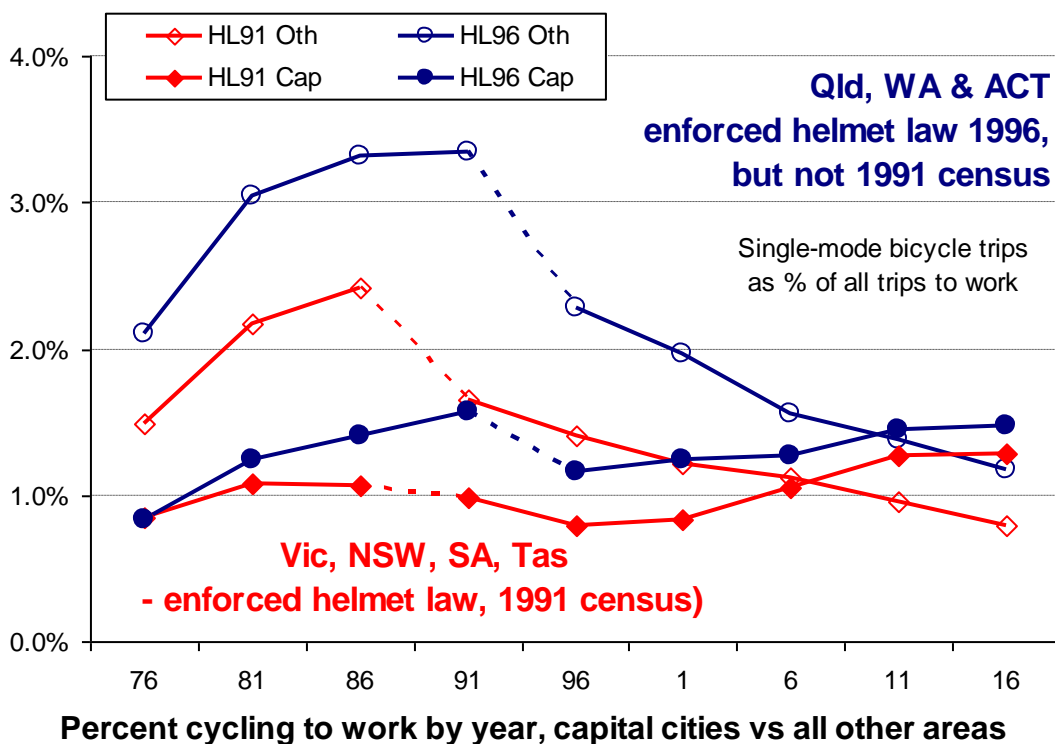
counted in the 1990 and 1991 surveys are a good predictor of the effect of the law on teenage cycling, it is hard to understand why Cameron et al. (1994) chose to ‘estimate’ the effect of the law for adults using the straight line extrapolation technique that produces a totally incorrect and invalid result for teenage cycling. A simpler, more accurate and plausible alternative would have been to report the 29% reduction in numbers of adults counted post-law in 1991 compared to the 1990 pre-law survey.

The table below (from Robinson, 1996 [25]) reveals another interesting fact from the May 1990, 1991 and 1992 surveys in Melbourne – the increase of 297 cyclists wearing helmets was much less than the reduction of 1110 in numbers of cyclists counted, suggesting that the main effect of the law was to discourage cycling, rather than encourage non-helmeted cyclists to wear helmets. Although more helmeted cyclists were counted the following year, some of the increase was probably due to the better weekend weather in 1992 and the bicycle rally passing through one of the sites. Given the substantial health benefits of cycling (with or without a helmet), laws that discourage a greater proportion of people from cycling than are encouraged to wear helmets should not be considered a success.

Table 4. Counts of cyclists in Victoria before and during the first two years of the bicycle helmet law (from Finch et al. 1993)

Year	1990 (Pre law)		1991 (1st law year)		1992 (2nd law year)	
	Total counted	No. helmeted	Total counted	No. helmeted	Total counted	No. helmeted
Children up to 11 years	261	170	235	183	281	216
Change from 1990			-26	13	20	46
Children 12-17 years	1293	272	670	302	713	421
Change from 1990			-623	30	-580	149
Adult cyclists	1567	564	1106	818	1484	1247
Change from 1990			-461	254	-83	683
All cyclists	3121	1006	2011	1303	2478	1884
Change from 1990			-1110	297	-643	878

A longer-term series of counts (adult and child cyclists) was conducted over 6 years at 25 road intersections in Sydney over the same observation times. By 1996, there were 48% fewer cyclists than 1991 [26], contrasting with the increasing popularity of cycling before the helmet law when, in the Sydney metropolitan area, "cycling increased significantly (+250%) in the 1980s" [27]. The series consisted of four surveys in April and two in October. Proportionately more cyclists were observed in April than October, perhaps because autumn weather may be more conducive to cycling. The 48% reduction in counts of cyclists of all ages demonstrates that cycling did not ‘recover’ from the effect of the helmet law. The 25 sites were originally part of a larger survey that included pre-law counts in September/October 1990, a count in April 1991 (pre law for children, post-law for adults) and post-law counts in April 1992 and 1993. Counts of children were 36% and 44% less in 1992 and 1993 than the April 1991 pre-law count, with across-the-board reductions in cycling on roads, recreational areas and at school gates, and also in metropolitan and regional areas. The post-law surveys for adults were in April in sunny conditions, but the only pre-law survey was in overcast conditions in September [28] with rain on



successive weekends that prevented observations in one town from being completed [29]. This makes it difficult to separate the effect of overcast and inclement weather from the effect of the law on adult cycling. **Census data on cycling to work show the helmet law significantly reduced adult cycling.** After classifying by whether there was an enforced law at the time of the

1991 census and by capital cities vs. other regions, it appears that the deterrent effect of the helmet law was much greater in rural and regional cities, many of which had short commuting distances and wide, low-traffic streets that were generally more conducive to cycling. This suggests that helmet laws are much more of a deterrent when cycling conditions are considered safe. It is consistent with the Norwegian research that helmet laws disproportionately discourage the safest cyclists [30]. In unsafe conditions, most cyclists would choose to wear a helmet irrespective of the law.

Perth cycle-way counts also show reduced cycling. Automatic counters installed on two key cyclist bridges in Perth over the Swan River recorded an average of 16,326 cycle movements weekly for the three months October to December 1991 (pre-law). The same months in the postlaw years 1992-94 recorded 13067, 12470 and 10701 cyclist movements per week, reductions of 20%, 24% and 34% in years 1 to 3 of the law. Even though counts at two sites might not be representative of the entire city, the results suggest a substantial deterrent. Before the law, cycling in WA was enjoying a tremendous increase in popularity, with cycling growing at 12% a year in the 1980s. The law saw the start of a decline. One bike hire company, which recorded only two minor injuries in 100,000 hirings, claimed to have lost 90% of its business overnight and within 6 months of the WA helmet law, five cycle shops went bankrupt and bike sales dropped by 70% [25].

Australians say helmet laws discourage them from cycling. A street survey in the Northern Territory, published in 1993, found that 20% of cyclists had given up because of the law and 42% said they had reduced their cycling [25]. In NSW, 51% of schoolchildren owning bikes, who hadn't cycled in the past week, cited helmet restrictions, substantially more than other reasons, including safety (18%) and parents (20%) [25]. When 325 cyclists in the ACT were asked in May 1992: "*Would you cycle less if helmets became compulsory?*", 28% said they would [25].

In Western Australia (WA), a telephone survey in which adults responded on behalf of themselves and their children found 13% of Perth and 8% of country cyclists had given up or cycled less because of the law. However, when the adult respondents in the telephone survey replied for themselves an estimated 27% of the State's adult population - cyclists and non cyclists - (the equivalent of 64% of current adult cyclists) said they would cycle more if not legally required to wear a helmet.

In 2011, Chris Rissel, Professor of Public Health, University of Sydney, studied the extent to which helmet laws continue to discourage cycling and concluded that making helmets optional could double the amount of cycling - <http://theconversation.edu.au/make-helmets-optional-to-double-the-number-of-cyclists-in-australia-4578>.

Prof Rissel explained: "*Not all cycling is equally dangerous – mountain biking and racing are far riskier than recreational riding on a separated off-road bike path. Mandating helmets for all riders at all times, therefore, is a very blunt tool to attempt to increase bicycle safety If we're serious about improving Australians' health and getting more people active, it's time to bring Australia and New Zealand in line with the rest of the world and acknowledge that the helmet experiment has failed.*"

As well as making cycling less enjoyable, the requirement to wear a helmet makes many people think that cycling is an exceptionally dangerous form of transport. Some might even come to believe that the risks are unacceptable, except on segregated cycleways. In 1991, just before WA's helmet law, an estimated 5.7% of trips in Perth were by bike [31]. The Metropolitan Transport Strategy aimed to increase cycling to 8% of trips by 2010 and 11.5% by 2029 [32]. Instead, cycling plummeted to 1.6% of trips (2003-2006) [33]. The much higher pre-law levels of cycling (accounting for 5.7% of trips in Perth in 1991 and 3.6% of trips to work in regional areas), *despite less cycling infrastructure*, suggests that people who dislike helmets (but have been led to believe that cycling without one is unsafe, so it seems illogical to argue against helmet laws) might list safety or lack of infrastructure as the main reason for not cycling.

Helmet-law surveys and social desirability bias. The tendency in surveys to under-report undesirable and over-report desirable behaviour (e.g. exercise) is called the 'Social Desirability Bias' [34]. Alcohol consumption is a notable example; almost half of alcohol sold was found to be unaccounted for in consumption figures given by drinkers [35].

An investigation into the effect of South Australia's helmet law noted that "*From the substantial reductions in hospital admissions immediately after the legislation was introduced it is likely that there*





was an immediate reduction in exposure” [36]. Results from the SA Health Omnibus Surveys (HOS) were, however, somewhat contradictory. There was no change in the proportion of adults saying they cycled at least once a week from 1990 to 1993, but when asked about where they had cycled in the past 7 days, the proportion of males aged 15+ who could name a destination fell from 17.5% to 13.3% (a 24% reduction) and the proportion of females aged 15+ fell from 7.5% to 5.5% (26% reduction). This suggests that while there was no change in proportions saying they cycled at least weekly, significantly fewer people actually cycled in the week before interview in 1993 than 1990. The SA HOS used face-to-face interviewing in October-November 1990 and 1993, so cycle-use is unlikely to have been impacted by weather or seasonal differences. Perhaps to avoid social desirability or other biases, the current Australian Cycling Participation Survey asks respondents about specific bicycle trips instead of more general questions on the frequency of cycling.

Discouraging the safest cyclists. A Norwegian study asked cyclists about their attitudes to risk and concluded that helmet laws disproportionately discourage the safest cyclists [30]. The disproportionate drop in cycling to work in regional areas, evident in Australian census data, also illustrates the point. Regional cities such as Armidale, NSW, have wide streets, less traffic and shorter travel distances than major capital cities. Armidale and other regional cities seemed like very safe places to cycle until helmet laws were introduced. The large reductions in cycling to work in regional areas illustrate how well-meaning policies can backfire. Cycling was discouraged because helmet laws made cycling less convenient and less enjoyable, and made people think that it was extremely dangerous.

The photos below, compiled by the [Upright Bicycle Riders Society of Australia](#) aptly illustrate evidence that riskier types of cycling (where it’s normal to wear a helmet) were much less discouraged than safe, normal, everyday cycling for transport. This may be one reason why injury rates per cyclist seem to be much higher than would have been expected without helmet laws.

Mandatory Helmet Laws (MHL)
Effects on bike riding in Australia.

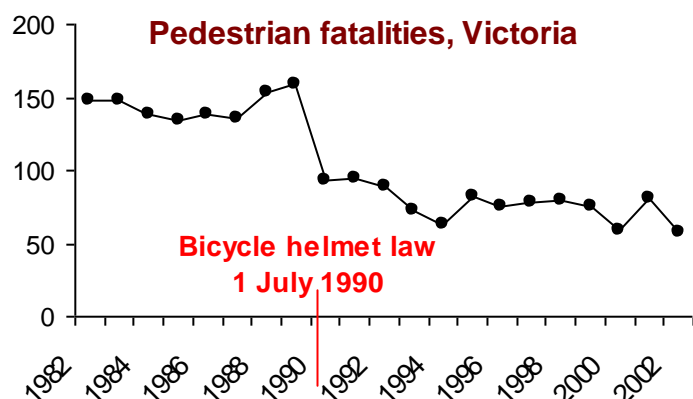
MHL introduced 1990-1994

<p>20 years before MHL</p>  <p><small>Pic source: smh.com.au</small></p>	Road Cycling	<p>20 years after MHL</p>  <p><small>Pic source: smh.com.au</small></p>
It's not the bikes you see...		
<p>20 years before MHL</p> 	Everyday Bike Riding	<p>20 years after MHL</p> 

It's the bikes you don't see that tell the full story.

#endMHL

Higher injury rates than expected without the law. Evidence from New York and Ireland shows substantial increases in safety as cycling became popular. In Victoria, other road safety measures were introduced about the same time as the bicycle helmet law. The graph (left) illustrates the 42% drop in pedestrian fatalities coinciding almost exactly with the start of the bicycle helmet law. After accounting for the large drops in cycling, including a 43-46% drop in cycling of teenagers [22] (who generally have a higher injury rate than adults) injury rates of cyclists appear to have increased relative to other road users [24]. Table 5 below (from Robinson, 1996 [25]) also shows a substantial increase in the number of injuries relative to the amount of cycling. More detailed results presented in the paper show a downward trend in the proportion of cyclists with head injuries, indicating that head injuries relative to the amount of cycling were little different to what would have been expected without the law. A more comprehensive analysis comparing Transport Accident Commission data on deaths and serious injuries to pedestrians and cyclists in Victoria [24] also indicates that injury rates per cyclist increased after helmet laws were introduced.



After accounting for the large drops in cycling, including a 43-46% drop in cycling of teenagers [22] (who generally have a higher injury rate than adults) injury rates of cyclists appear to have increased relative to other road users [24]. Table 5 below (from Robinson, 1996 [25]) also shows a substantial increase in the number of injuries relative to the amount of cycling. More detailed results presented in the paper show a downward trend in the proportion of cyclists with head injuries, indicating that head injuries relative to the amount of cycling were little different to what would have been expected without the law. A more comprehensive analysis comparing Transport Accident Commission data on deaths and serious injuries to pedestrians and cyclists in Victoria [24] also indicates that injury rates per cyclist increased after helmet laws were introduced.

Table 5. Children’s cycling activity and bicycle injuries, Melbourne (VISS injury data)

Year to end June	Proportion of 1990 cycle use (N)	Total cycling injuries, (C)	Total head injuries (H)	Equivalent no of injuries for pre law cycle use	
				All injuries (= C/N)	Head injury (= H/N)
1990	1.00	809	88	809	88
1991	0.67	628	60	937	90
1992	0.64	604	58	944	91
1993	n/a	633	63		

A similar analysis for injuries to child cyclists in NSW leads to similar conclusions – that injury rates per cyclist increased after helmet laws – see Tables 2 and 3 below (from Robinson, 1996 [25]).

Table 2. Injuries of cyclists under 16 admitted to hospital in NSW (Source NSW Health Department) compared with estimated amount of cycling

Year to end June	No of head injuries (H)	No of non head injuries (O)	No of cyclists (Proportion of 1991) (N)	Equivalent no of injuries for pre law numbers of cyclists	
				Head injury (= H/N)	Other injury (= O/N)
1989	414	908			
1990	453	1053			
1991	384	926	1.00	384	926
1992	272	815	0.64	425	1273
1993	273	893	0.56	488	1595

Table 3. Numbers of reported deaths and serious injuries (DSI) for various road users aged 0–16 in NSW (from Road Traffic Accidents in NSW)

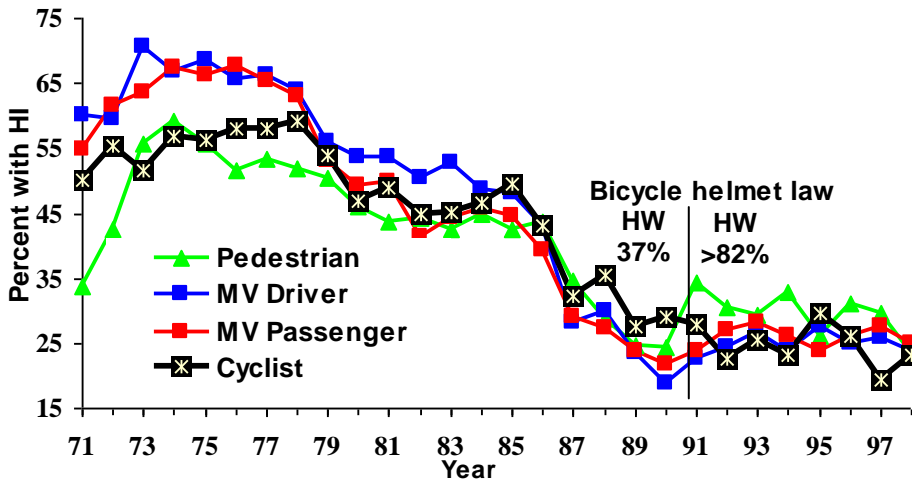
Year to end December	Reported DSI, all child road users	Reported Pedestrian DSI, (P)	Reported DSI, Cyclists (C)	No of cyclists (proportion of pre law), (N)	DSI for pre law no of cyclists (R = C/N)	Cyclist DSI vs Pedestrian = R/P
1989	1207	380	175			
1990	1037	354	152	1.00	152	0.43
1991	877	315	115			
1992	836	316	97	0.64	152	0.48
1993	829	281	103	0.56	184	0.65

In New Zealand (where an all-age helmet law was mandated in 1994) from 1989 to 2011, average time spent cycling (on roads and footpaths) fell by 79% for children aged 5-12 (from 28 to 6 minutes per person per week) and 81% for 13-17 year olds (52 to 10 mins/person/week). Adult cycling declined from 8 to 5 minutes/person/week then trended back up to 8 minutes. Graphs of cycle use over time provide strong evidence that the requirement to wear a helmet discouraged cycling [37].

The reductions in cycling in NZ were accompanied by increased injury rates. Between 1989 and 2012, fatal or serious injuries per million hours of cycling *increased by 86%* for children (from 49 to 91), *181%* for teenagers (from 18 to 51) and *64%* for adults (from 23 to 38).[37]

Two recent studies also associated helmet use with *increased* injury rates. 1) Individuals with documented helmet use had 2.18 (95% CI = 1.22, 3.89) times the odds of non-helmet users of being involved in an injury-related accident (Pedroso et al., 2106 [38]). 2) Helmet use by transport cyclists was associated with being injured while cycling in the past 2 years (OR=2.81, 95% CI=1.14, 6.94, Porter et al. (2016) [39]).

No obvious decline in percentages of cyclists with head injury when helmet laws were introduced – hospital statistics show similar trends in head injury percentages of all road users

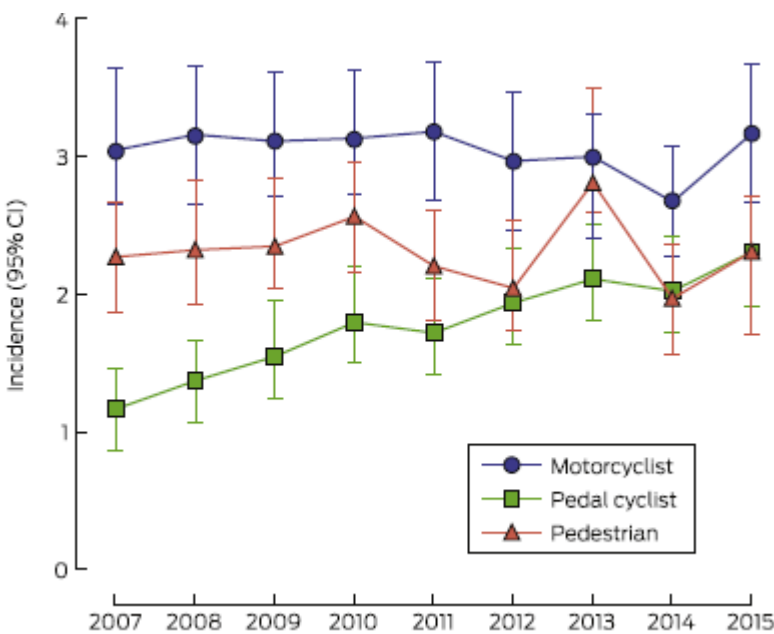


The graph above of road users admitted to hospitals in Western Australia clearly shows that head injury percentages follow similar trends for all road users, with little or no obvious benefit of a law that increased helmet wearing from 37% to about 82% of all cyclists.

Similar data are available for NSW, South Australia and New Zealand [40]. They all show that the large increases in helmet wearing did not produce large, obvious reductions in the proportions of cyclists with head injuries over and above the generally declining trends. Thus, in comparison with other road safety measures such as random breath testing, bicycle helmet laws have not been successful. Much greater improvements in cyclist safety could almost certainly have been achieved, without discouraging cycling, by concentrating on other, more effective, road safety measures.

Continued increases in injuries to Australian cyclists despite decreased cycling.

The National Cycling Participation survey reports that the proportions cycling at least weekly in Victoria fell from 19.9% in 2011 to 16.4% in 2013 and 16.6% in 2015. The proportions cycling at least monthly and annually fell from 29.9% and 42.6% (2011) to 25.3% and 38.0% (2013) to 23.2% and 35.9% (2015) [41]. Despite the reductions in cycling, the graph (left, from Beck 2017 [42]) shows that serious injuries per 100,000 population continue to increase for cyclists, with no corresponding increases for motor vehicle occupants, pedestrians or motorcyclists. This suggests that cycling is becoming more dangerous in Victoria compared to overall road safety conditions.



The introduction of tougher penalties for cyclists in NSW also appears to have discouraged cycling. In the first 12 months of tougher penalties, the NSW government collected \$2.25 million for the top five

cycling offences, compared to \$429,000 from those same penalties in the prior period. Fines for not wearing a bicycle helmet raised \$1.99 million [43]. Compared to 2015, the National Cycling Participation Survey shows reductions of 25%, 24% and 18% in the proportion of NSW residents cycling at least weekly, monthly or annually. By contrast, numbers of injuries to cyclists (in the first 10 months of the regulations) fell by only 7%, again suggesting that imposing stricter penalties on cyclists for not wearing helmets (which raised \$1.99 million in revenue) not only discouraged cycling but also *increased* injury rates per cyclist, perhaps because of reduced safety in numbers.

Many countries without helmet laws have seen much greater reductions in cycling fatalities without helmet laws. The table below was compiled by Chris Gillham from data published by the OECD [44].

Country	1990	2000	2010	2011	2013	2014	% change 1990-2014	Helmet law
Australia	80	31	38	34	50	44	-45.0%	Yes all ages
Austria	106	62	32	42	51	45	-57.5%	No
Belgium	196	134	70	68	73	76	-61.2%	No
Canada	106	40	61	50	63	60	-43.4%	Yes some provinces
Czech Republic	135	151	80	63	74	68	-49.6%	Yes children to 18
Denmark	110	58	26	30	33	30	-72.7%	No
Finland	101	53	26	19	20	27	-73.3%	Yes 2011 37%
France	429	273	147	141	147	159	-63.6%	No
Germany	925	659	381	399	354	396	-57.2%	No
Greece	26	22	23	13	15	19	-26.9%	No
Hungary	313	182	92	85	68	98	-68.7%	No
Iceland	0	0	0	0	0	0	0%	Yes children to 14
Ireland	46	10	5	9	5	13	-71.7%	No
Italy	477	401	265	282	251	273	-42.8%	No
Jamaica	56		26	33	17	26	-53.6%	No
Japan	1,509	1,278	938	864	813	738	-51.1%	No
Korea	644	317	294	272	281	272	-57.8%	No
Luxembourg	1	1	1	2	0	0	100.0%	No
Netherlands	304	233	162	200	184	185	-21.0%	No
New Zealand	27	19	10	9	8	10	-63.0%	Yes all ages
Norway	17	13	5	11	10	12	-29.4%	No
Poland	574	692	280	314	306	286	-50.2%	No
Portugal	120	62	31	44	29	35	-70.8%	No
Spain	160	84	67	49	69	75	-53.1%	Yes except built up
Sweden	68	47	21	21	14	33	-51.5%	Yes children to 15
Switzerland	58	48	34	39	21	34	-41.4%	No
UK	267	131	111	109	113	116	-56.6%	No
USA	859	693	623	677	749	726	-15.5%	21 states children
All	7,714	5,694	3,849	3,879	3,818	3,856	-50.0%	28 countries
No law countries	6,178	4,576	2,923	2,956	2,771	2,813	-54.5%	19 no law
Law countries	1,536	1,118	926	922	1,047	1,043	-32.1%	9 with some law

Many countries appear to have enjoyed greater reductions in cycling fatalities than Australia without discouraging cycling by introducing helmet laws. In general, countries with low helmet wearing have more cyclists and lower fatality rates per kilometre cycled.

Queensland Parliamentary Committee Inquiry not convinced that helmet laws are justified

Bicycle Helmet laws were reviewed in a Queensland Parliamentary Committee Inquiry (number 39) in November 2013 – See <http://www.parliament.qld.gov.au/documents/committees/thlgc/2013/inqcyc/rp-39-29nov13.pdf>

After reviewing the evidence, page 46/47 of the parliamentary report states:

4.3.4 Committee comment and recommendation

“...the Committee is not convinced there is sufficient evidence of the safety outcomes of compulsory helmet wearing to justify the mandating of helmet wearing for all cyclists of all ages regardless of the situational risk.

“The Committee is concerned that the introduction of mandatory helmet laws may have had an unintended, adverse impact on cycling participation rates in Queensland and therefore the overall health of the state. It also believes there is sufficient evidence provided by the Northern Territory example that a relaxation of mandatory helmet laws in lower risk situations (such as cycling on footpaths and on dedicated cycle paths), does not inevitably reduce the safety of cycling.

“The Committee is therefore of the view that relaxing mandatory helmet laws in specific circumstance is likely to increase cycling participation rates with a range of associated health benefits and economic benefits in tourism areas. The Committee also believes that a relaxation of mandatory helmet laws may assist in normalising the perception of cyclists by motorists.”

Transport and Main Roads Minister Scott Emerson responded to the Committee recommendations saying: *“It is not in the public interest to introduce a trial that may increase any risk of head injuries to cyclists.”*

The minister’s response ignores the Committee’s concern that *“helmet laws may have had an unintended, adverse impact on cycling participation rates in Queensland and therefore the overall health of the state.”* As noted above, good decision-making requires accurate information. Despite the perceptions of the public and of politicians, the evidence presented here suggests that Australians are likely to suffer a dozen or more heart attacks and strokes for every head injury prevented by helmet laws, i.e. the community would be much better off without them.

Summary & Conclusions

Given the considerable health benefits of cycling (with or without a helmet), laws that discourage cycling should not be considered a success.

There is a substantial body of evidence that Australia’s bicycle laws discourage cycling. This includes counts of cyclists at the same sites, observation periods and time of year, automatic counters on cycle routes covering identical pre-law and post-law periods, and surveys that asked cyclists if they had reduced or given up cycling because of helmet laws, or if they would cycle more if not legally required to wear a helmet.

Campaigns to persuade Australian cyclists to obey the helmet law usually portray cycling as exceedingly dangerous. This leads to the common perception that cycling is a dangerous activity that should be avoided, leading to even more reductions in the popularity of cycling.

Statistics suggest that the helmet law has failed to prevent injuries. Cycling in many countries without helmet laws has increased in popularity and safety, thanks in part to public bike schemes and increased safety in numbers. By contrast, the safety of cycling in Australia appears to have decreased. Australia’s public bike schemes are amongst the least patronised in the world – those with docking stations do not appear to be financially viable and the viability of dockless bike schemes is in doubt. Australian cyclists appear to be less respected than before helmet laws were introduced. The photo of a dockless bike attached above head height to a lamp post and reports of 42 dockless bikes fished out of the Yarra River [45] suggest that the lack of respect for cycling is being expressed by throwing bikes in the river.

There is some evidence that motorists give less room to cyclists who wear a helmet, and indeed give more room to long-haired female cyclists who might be seen as more vulnerable [46]. If motorists think of cyclists as vulnerable human beings, like their friends, children, or other relatives, they are more likely

to take care when they encounter cyclists. The same applies to motor vehicle drivers who also cycle regularly.

Allowing cyclists to choose is likely to have a minimal impact on head injuries, because most cyclists will choose to wear helmets on roads perceived to be dangerous. However, it will not only encourage more people to cycle, resulting in better public health and increased safety in numbers, but also help remind drivers of the vulnerability of cyclists leading to greater respect and a more pleasant, safer cycling environment.

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