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Never Stand Still | Science

18 September 2015

Senator David Leyonhjelm
Senator for NSW
PO Box 6100
Senate
Parliament House
Canberra ACT 2600

Via email: economics.sen@aph.gov.au

Dear Senator Leyonhjelm,

Re: **INQUIRY INTO PERSONAL CHOICE AND COMMUNITY IMPACTS**

We are pleased to provide you with our *2015 Submission to the Senate Inquiry into personal choice and community impacts*.

We are prepared to offer expert opinion regarding our findings and any questions the committee may want to ask in regards to these issues. The Authors have a long history and track record in making submissions to government inquests focussing on aspects of road safety.

Our submission was prepared and submitted by:

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Background

On 25 June 2015, the Senate moved that the following matters be referred to the Senate Economics References Committee for inquiry and report by 13 June 2016.

The economic and social impact of legislation, policies or Commonwealth guidelines, with particular reference to:

a. the sale and use of tobacco, tobacco products, nicotine products, and e-cigarettes, including any impact on the health, enjoyment and finances of users and non-users;
b. the sale and service of alcohol, including any impact on crime and the health, enjoyment and finances of drinkers and non-drinkers;
c. the sale and use of marijuana and associated products, including any impact on the health, enjoyment and finances of users and non-users;
d. bicycle helmet laws, including any impact on the health, enjoyment and finances of cyclists and non-cyclists;
e. the classification of publications, films and computer games; and
f. any other measures introduced to restrict personal choice 'for the individual's own good'.

The Transport and Road Safety (TARS) Research team at The University of New South Wales (UNSW) is a private and publically funded research group (see: http://www.tars.unsw.edu.au/). We are an internationally recognised multi-disciplinary team of highly skilled experienced researchers with world leading track records in various aspects of road and transport safety. Associate Professor Jake Olivier from the School of Mathematics and Statistics works closely with TARS researchers (see: https://www.maths.unsw.edu.au/ and https://research.unsw.edu.au/people/associate-professor-jake-olivier).

In this submission, we specifically address point d. regarding bicycle helmet laws.

D. bicycle helmet laws, including any impact on the health, enjoyment and finances of cyclists and non-cyclists

Research into bicycle helmet laws can be divided into several broad categories: helmet effectiveness to mitigate head injury, uptake of helmet wearing, and the legislative impact on head injuries and fatalities.

Bicycle helmets are designed to mitigate head injury during a collision or fall. There is substantial biomechanical evidence using test dummies that helmet use will lessen the kinetic energy to the head when struck in a collision. There have been many case-control studies that assess the association between helmet wearing and head injury. These studies have been summarised in three reviews and, in each case, the odds of a head injury were significantly diminished for cyclists wearing helmets versus those that did not. There is clear evidence that helmet legislation in Australia has resulted in large uptake of helmet use. The legislation is also associated with a drop in head injury hospitalisations.

Helmet opponents argue helmets increase the risk of rotational injury and helmets only protect against minor injury. Further, they claim helmet use increases the propensity for risky behaviour, i.e., the risk compensation hypothesis. The arguments against bicycle helmet laws include it is a cycling deterrent, makes cycling more dangerous (safety-in-numbers effect), and result in a net health reduction. When the majority of evidence against helmets or MHL is carefully scrutinised such arguments appear overstated, misleading or invalid.

We will highlight the available research on each topic in turn.

Helmet Effectiveness

- There have been two systematic reviews, a meta-analysis and a re-analysis of the meta-analysis of case-controls studies assessing bicycle helmet effectiveness[1,2,3]
- The best summary estimates of bicycle helmet effectiveness is a 60% reduction in the odds of head injury, a 58% reduction in the odds of brain injury, a 47% reduction in the odds of facial injury and a 73% reduction in the odds of a fatality.[2]
- There is no evidence helmet use significantly increases the odds or risk of neck injury.[2]
- We found significant reductions in the risk of head injury for helmeted cyclists in collisions with motor vehicles and the reduction was greater as injuries considered were more severe in a recent Australian study.[4]

Uptake of Helmet Wearing

Following helmet legislation, helmet use

- Increased by 44% and 51% for children and adults respectively in NSW.[5]
- Increased by 44% and 76% for children and adults respectively in SA.[6]
- Increased by 44% in Victoria.[7]
- Comprised 71% of last reported cycling trips in WA.[8]

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[1] Thompson, D.C., Rivara, F. & Thompson, R. (1999). Helmets for preventing head and facial injuries in bicyclists. Cochrane Review, Issue 4. Art. No.: CD001855.
[2] Attewell, R.G., Glase, K. & McFadden, M. (2001). Bicycle helmet efficacy: a meta-analysis. Accident Analysis and Prevention, 33, 345–352.
[3] Elvik, R. (2013). Corrigendum to: "Publication bias and time-trend bias in meta-analysis of bicycle helmet efficacy: A re-analysis of Attewell, Glase and McFadden, 2001". Accident Analysis and Prevention, 60, 245-253.
[4] Bambach, M.R., Mitchell, R.J., Grzebieta, R.H. & Olivier, J. (2013). The effectiveness of helmets in bicycle collisions with motor vehicles: A case–control study. Accident Analysis and Prevention, 53, 78-88.
[5] Smith, N. & Milthorpe, F. (1993). An observational survey of law compliance and helmet wearing by bicyclists in New South Wales – 1993. NSW Roads and Traffic Authority, Rosebery, NSW
[6] Marshall, J. & White, M. (1994). Evaluation of the compulsory helmet wearing legislation for bicyclists in South Australia. South Australian Department of Transport, Walkerville, SA.
[7] Cameron, M., Newstead, S., Vulcan, P. & Finch, C. (1994). Effects of the compulsory bicycle helmet law in Victoria during its first three years. Proceedings of 1994 Pedestrian and Bicyclist Safety and Travel Workshop, Melbourne, Australia, ed. Adreassen, D. & Rose, G, 165-176.
[8] Heathcote, B., Maisey, G., 1994. Bicycle use and attitudes to the helmet wearing law. Traffic Board of Western Australia, TB94 - 1, Perth, WA.

Legislative Impact on Cycling Head Injuries and Fatalities

Following helmet legislation,

- Head injury hospitalisations dropped by 29% in NSW (see Figure 1).[9,10] The benefit of helmet wearing relative to other cycling injuries has increased to a 50% decline over the past two decades (see Figure 2).[11]
- As a result of the introduction of the NSW mandatory helmet law, it is estimated that around 700 serious head injuries to cyclists resulting from crashes were prevented in 2010 alone. This is estimated at around $350 million in cost saving to the NSW health system.
- Mandatory bicycle helmet legislation is associated with a 59% reduction in cycling fatality across all Australian states, ACT, NT and NZ (see Figure 3)
- There was an average of 111 cycling fatalities per year prior to bicycle helmet legislation with around 45 annual fatalities in recent years (see Figure 4)

Arguments Against Mandatory Helmet Legislation

- Arguments against bicycle helmets and/or bicycle helmet legislation are often overstated, misleading or invalid,[12]
- Three reviews in peer-reviewed journals have concluded bicycle helmets mitigate the incidence and severity of head injury,
- No evidence that rotational injuries are associated with helmet wearing,
- No evidence cyclists exhibit riskier behaviour after putting on a helmet, though there is evidence unhelmeted cyclists are associated with illegal behaviour (for example, alcohol use)[4],
- There is conflicting evidence helmet legislation is associated with less cycling. For example, SA and WA surveys found no change in the amount of cycling before and after helmet legislation using stratified random sampling (Table 1), and
- Current opinions in Australia regarding bicycle helmets suggest it is a minor issue with more important concerns regarding cycling. Recent surveys list helmet wearing as the 10th and 13th most common barrier to cycling among current and non-cyclists respectively.[13] This survey allowed for multiple responses making it difficult to ascertain the primary deterrent to cycling; however, helmet wearing comprised approximately 4% of all responses. In a survey of Australian women regarding encouraging women to cycle more,

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[9] Walter SR, Olivier J, Churches T and Grzebieta R. (2011) "The impact of compulsory cycle helmet legislation on cyclist head injuries in New South Wales, Australia." Accident Analysis and Prevention, 43(6): 2064-2071.
[10] Walter SR, Olivier J, Churches T and Grzebieta R. (2013) "The impact of compulsory cycle helmet legislation on cyclist head injuries in New South Wales, Australia: A response," Accident Analysis and Prevention, 52: 204-209.
[11] Olivier J, Walter SR and Grzebieta RH. (2013) "Long term bicycle related head injury trends for New South Wales, Australia following mandatory helmet legislation," Accident Analysis and Prevention, 50: 1128-1134.
[12] Olivier J, Wang JJJ, Walter S & Grzebieta R. (2014) Anti-Helmet Arguments: Lies, damned lies and flawed statistics. Journal of the Australasian College of Road Safety, 25(4): 10-23. http://acrs.org.au/wp-content/uploads/ACRSjournalVol25NoNov14WEB-1.pdf
[13] Cycling Promotion Fund. (2011). Riding a Bike for Transport: 2011 Survey Findings. Available at: http://www.heartfoundation.org.au/SiteCollectionDocuments/Cycling-Survey-2011-Riding-a-Bike-for-Transport.pdf

4.1% gave the repeal of the helmet law as their main response.[14] In both surveys, the lack of cycling infrastructure and safety concerns were much more common responses.

There have been many calls to repeal mandatory helmet legislation (MHL) in Australia. Indeed, submissions have been provided to this inquest supporting repeal of MHL. However, these arguments do not hold up to objective scrutiny. Cyclists in the vast majority agree that helmets are efficacious in reducing head injuries, particularly serious head injuries. Only 1% of Australians strongly disapprove of government mandated helmet wearing while 94% approve of such a law.[15]

Objections to helmet laws are largely unfounded, voiced by a very small but vocal group of antagonists. Their arguments and public voicing is a sideshow to more important and proven factors associated with increased cycling safety and numbers, e.g., increase in cycling infrastructure that segregates cyclists from other road users.

Appendix 1 provides a copy of the journal article recently published by two of the Authors making this submission.

[14] Cycling Promotion Fund. (2013). Women and cycling survey 2013. Available at: http://www.heartfoundation.org.au/news-media/Media-Releases-2013/Documents/CPF%20-%20Women%20and%20Cycling%20Survey%202013.pdf
[15] See: http://essentialvision.com.au/documents/essential_report_120430.pdf

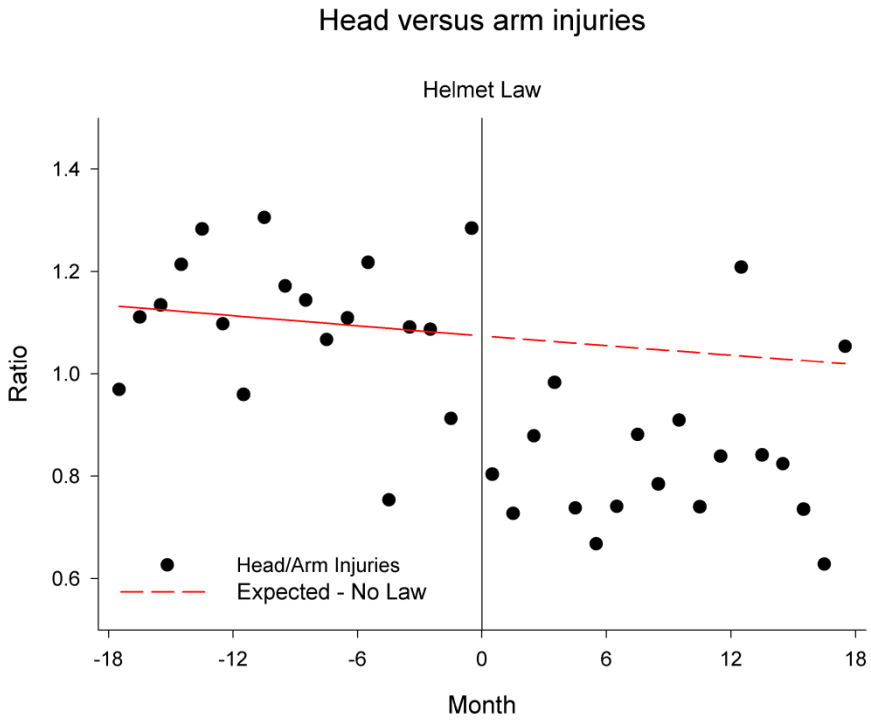

Figure 1: Cyclist head and arm injury rates and predicted values for 18 months prior and 18 months post helmet legislation. Source: NSW Admitted Patients Data Collection (HOIST).

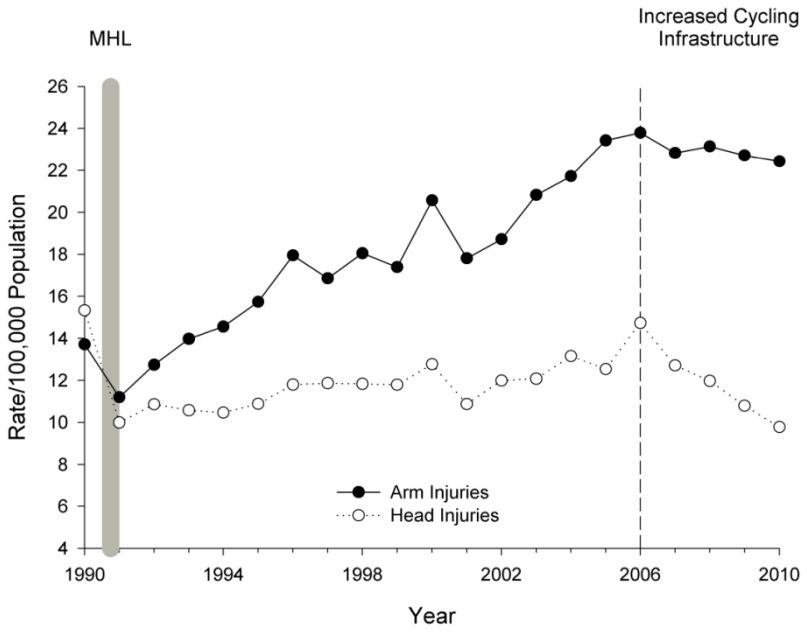

Figure 2: Rates per 100,000 population of bicycle related head and arm hospitalisations in New South Wales by year (1991–2010). Source: Admitted Patients Data Collection (HOIST).

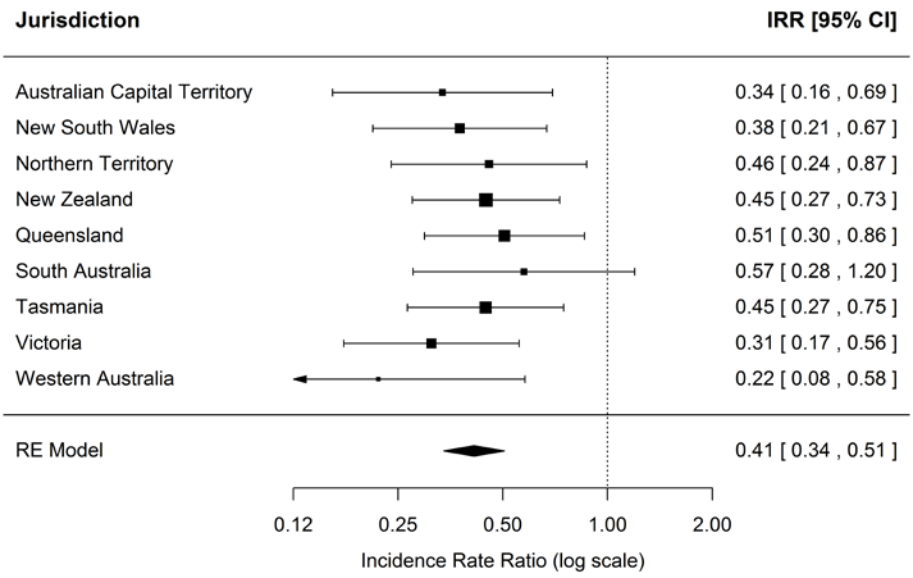

Figure 3: Incidence rate ratios (IRR) of the immediate change in cycling fatality in Australian states/territories and New Zealand following mandatory bicycle helmet legislation

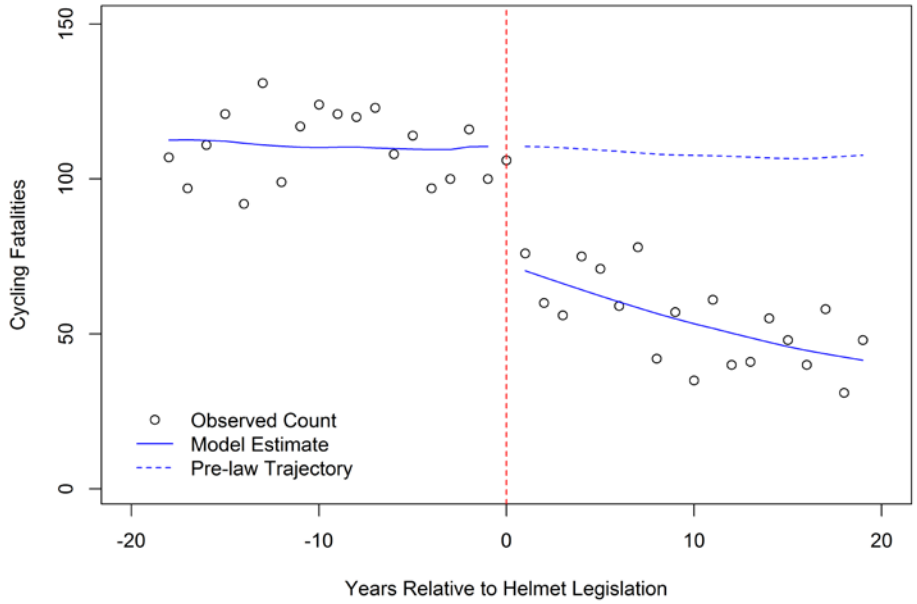

Figure 4: Scatterplot and estimated trend in cycling fatalities before and after helmet legislation in Australian states/territories and New Zealand

Table 1: Estimates of cycling participation in South Australia and Western Australia before and after helmet legislation[6,8]

South Australia			Western Australia		
	1990	1993		1989	1993
At least weekly	21.8%	21.0%	At least weekly	26.6%	27.7%
At least monthly	5.2%	6.0%	At least every 3 months	11.1%	11.6%
At least every 3 mont	3.9%	4.4%	At least once per year	10.3%	11.5%
Less often or never	69.1%	68.6%	Never	52.0%	49.2%

Appendix 1

Olivier J, Wang JJJ, Walter S & Grzebieta R. (2014) Anti-Helmet Arguments: Lies, damned lies and flawed statistics. Journal of the Australasian College of Road Safety, 25(4): 10-23.