

Inquiry on personal choice and community safety

Professor Chris Rissel

I write to make a submission to the inquiry on personal choice and community safety in relation to the impact of mandatory bicycle helmet laws, including the impact on the health, enjoyment and finances of cyclists and non-cyclists.

The literature is clear and consistent that there are many individual and societal benefits from more people cycling, and cycling more often (Table 1).

Table 1: Reports/reviews assessing health benefits of cycling.

Authors	Title	Year	Country
British Medical Association ¹	<i>Cycling towards health and safety</i>	1992	United Kingdom
Roberts I, Owen H, Lumb P, McDougall C ²	<i>Pedalling health — Health benefits of a modal transport shift</i>	1996	Australia
Cavill N, Davis A ³	<i>Cycling and health: What's the evidence?</i>	2007	United Kingdom
Bauman A, Rissel C, Garrard J, Kerr I, Speidel R, Fishman E ⁴	Cycling: Getting Australia moving — Barriers, facilitators and interventions to get more Australians physically active through cycling	2008	Australia
Hamer M, Chida Y ⁵	Active commuting and cardiovascular risk: A meta-analytic review	2008	Global
Oja P, Titze S, Bauman A, de Geus B, Krenn P, Reger-Nash B, Kohlberger T ⁶	Health benefits of cycling: A systematic review	2011	Global
British Medical Association ⁷	Healthy transport = Healthy lives	2012	British Medical Association
Garrard J, Rissel C, Bauman A ⁸	Health benefits of cycling	2012	Global

In an effort to reduce cycling head injuries, Australia introduced mandatory helmet legislation in 1991-92 (and New Zealand followed suit in 1994). This legislation has been consistently contested since its introduction.⁹⁻¹² The rest of the world has not embraced this policy because of the negative effects on cycling participation. The main objections about laws requiring bicycle helmets to be worn by all people at all times when cycling are that the efficacy of bicycle helmets in protecting cyclists has been exaggerated;¹³ the legislation has had an extremely negative effect on cycling participation;^{14 15} and the evidence that such legislation has achieved any meaningful reductions in rates of brain or head injuries is weak and does not acknowledge the long-term downward trends that are evident.¹⁶

Two major economic modeling studies (one in Australia and one in Germany) have looked at the costs and benefits of mandatory helmet legislation.^{17 18} Both studies were conservative in their assumptions of the drop in cycling and both still concluded that the costs of mandatory helmet legislation was substantially greater than the benefits. If the effects of the reduction in cycling in Australia that were observed (about 30-40%)¹² were modelled for Germany, then the negative effects of helmet legislation would be very substantial.

Repealing the legislation would mean that police and judicial resources are not wasted on a minor “offense” that causes no harm to others. In the Northern Territory it is legal to ride on footpaths and cycle paths without a helmet. Cycling injury rates in NT are similar to the national average.¹⁹

Mandatory helmet legislation deters people from cycling

There is general agreement that people stopped riding when the legislation was introduced. Based on census data on journey to work, cycling levels have still not recovered to 1986 levels,²⁰ with cycling to work representing only 1.2% of journeys in 2006.²¹ That there are fewer cycling trips in Australia in 2011 than in 1985 despite population increases.²²

The compulsion to wear a helmet has consistently been identified as one of the barriers to more people cycling in Australia, with about one in six *current cyclists* (16.5%) cite helmets as a reason for not cycling more.²³ A survey of 600 Sydney residents found that 1 in 5 (22.6%) of all respondents said that they would ride more if they did not have to wear a helmet.²⁴ If this increase in (even occasional) cycling were translated to the Sydney population of 4.5 million, this could represent a substantial increase in cycling levels, along with the associated health benefits.

A number of studies have been done around the world looking at the health benefits and injury costs of cycling – see table 2. All have concluded that the health benefits outweigh the injury costs, irrespective of helmet wearing. Pucher, Dill and Handy reviewed the international literature and concluded that “the combined evidence presented in these studies [from countries without universal helmet legislation] indicates that the health benefits of bicycling far exceed the health risks from traffic injuries”.²⁵

Table 2: Studies comparing the health benefits of cycling with injury/pollution costs.

Authors (date)	Location(s)	Basis for comparison	Main findings	Ratio of health benefit to cost
Hillman, 1992 ²⁶	Great Britain	Ratio of life-years gained through health benefits of cycling compared with life-years lost to cycling injuries.	Health-related life-years gained outweigh injury-related life-years lost by 20:1.	20:1
Woodcock et al., 2009 ²⁷	London/Delhi	Various sustainable travel scenarios considered. Weighs up both mortality effects and 'disability-adjusted life-years' (DALY) effects per million of population due to increased physical activity, injuries and pollution; also the societal benefits of reduced pollution and CO ₂ emissions.	Impacts per million population annually: <ul style="list-style-type: none"> Physical activity benefits: 528 deaths averted, saving 5496 life-years; plus a reduction of 2245 life-years impaired by disability, a saving of 7742 DALYs. Air pollution net benefits (note: societal benefits of reduced air pollution outweigh the pollution disbenefits for individuals who switch from car to active travel): 21 deaths averted, saving 200 life-years, plus 200 DALYs. Traffic crashes: net loss of 11 lives and 418 life-years, plus an increase of 101 life-years impaired by disability, a cost of 519 DALYs. 	Ratio for mortality: (5496:418) = 13:1 Ratio for DALYs: (7742:519) = 15:1

de Hartog, Boogaard, Nijland, & Hoek, 2010 ²⁸	Netherlands	Gains and losses per person per annum for adults aged 18-64 who switch from a regular car commute to cycling. Weighs up life-years gained per year through health benefits of cycling versus life-years lost to cycling injuries and pollution.	Average mortality gains/ losses: <ul style="list-style-type: none"> Physical activity benefits: range 3-14 months (mean = 8 months or 245 days). Injury costs: range 5-9 days (mean = 7 days). Pollution costs: range 0.8-40 days (mean = 21 days). 	9:1
Rabl & de Nazelle, 2012 ²⁹	Data from several EU cities	Considers annual value of mortality benefits and disbenefits for each individual who switches a regular short (5 km one-way) car commute to cycling. Weighs up life-years gained per year through health benefits of cycling, versus life-years lost to cycling injuries and pollution, and also societal benefits of reduced pollution.	Average annual value of benefits per person switching from car to cycle: <ul style="list-style-type: none"> Physical activity benefits = \$1310. Public health benefits from reduced pollution = \$33. Individual disbenefits from increased pollution = \$19. Individual disbenefits from injuries = \$53. 	1310:53 = 24:1 Including pollution effects on individuals and society = 19:1.
Rojas-Rueda, de Nazelle, Tainio, & Nieuwenhuisen, 2011 ³⁰	Barcelona	Calculates the overall mortality-related impacts of Barcelona's 'BICING' cycle hire scheme in terms of life-years gained through health benefits of scheme-users switching from car travel to cycling, versus life-years lost to cycling injuries and pollution. Also considers CO ₂ savings.	Life-years gained and lost annually by BICING scheme users: <ul style="list-style-type: none"> Deaths averted due to physical activity: 12.46. Deaths due to pollution: 0.13. Deaths due to injury: 0.03. 	Including pollution effects to individuals = 77:1*
Holm, Glumer, &	Copenhagen	Modelled the health impact assessment using DALYs of policy proposals to increase cycling.	<ul style="list-style-type: none"> Burden of disease from physical inactivity reduced by 76.0 DALYs. 	Net benefit of DALYs = 19.5 DALYS

Diderichsen, 2012 ³¹			<ul style="list-style-type: none"> Burden of disease from air pollution (5.4) and traffic accidents (51.2) increased by 56.5 DALYs. 	
Woodcock, Tainio, Cheshire, O'Brien, & Goodman, 2014 ³²	London	For London cycle hire scheme uses, assesses change in lifelong DALYs modelled through medium-term changes in physical activity, road traffic injuries and exposure to air pollution.	<ul style="list-style-type: none"> Men: all non-injury diseases averted = -83 DALYS. Men: Observed cycle high-injury rate = 10 DALYS. Women: all non-injury diseases averted = -22 DALYS. Women: Observed cycle high-injury rate = 6 DALYS. 	<p>Total DALYs^a = -88 DALYS</p> <p>^a negative DALYs represent a health benefit.</p>

*The Rojas-Reuda estimate of 77:1 overstates the benefits, because of incorrect assumptions that most bike trips replaced car trips³³

Cycling Safety

In terms of cycling safety, a drop in cycling participation leads to a decrease in safety because of the effects of the 'safety in numbers', where the more people that walk or cycle, the safer it becomes to walk or cycle.³⁴ Thus the introduction of mandatory helmet legislation had a negative impact on overall cycling safety.³⁵ This 'safety in numbers' effect has been demonstrated prospectively in a review of 10 public bike share programs in the United States.³⁶ The results showed that compared to the 24 months before implementation, in the 12 months post-implementation, head injuries in public bike-share cities fell by 14%, despite the increase in cycling from using public bikes and no requirement to wear helmets.

Early data from the London Bike Hire scheme (July 2011) showed there had been about 6 million trips taken without a serious injury. The Dublin scheme is the same size as Melbourne's scheme and has 10 times the daily use with no serious injuries. Helmets are not required in either the London or Dublin scheme. Helmet legislation has been identified as a barrier to the success of the Australian bicycle share programs.³⁷

Bicycle helmet legislation has made minimal improvement to cycling safety, and most cycling promotion advocates would say that an investment in cycling infrastructure would achieve much greater improvements in cycling safety.³⁸

Improvements in the road safety environment led to reduced cycling injuries, not helmet legislation

All the available long term data on cycling injuries and deaths in Australia show that there was a long decline in injuries among all road users prior to the helmet legislation (See 3 figures in the Appendix, including one using Western Australian data). This is consistent with international improvements in road safety in five countries at the same time.³⁹ The mandatory bicycle helmet legislation made little difference. A NSW study⁴⁰ that argued that the legislation was effective only studied a narrow window around the time of the legislation and ignored the longer term trends.

Bicycle helmets only protect 10-15% of head injuries

Recent reviews have re-evaluated the evidence and found significant bias in previous estimates.¹³ Helmets don't protect the neck and face, and may increase the risk of some injuries. The helmet legislation shows little impact on head and brain injuries, because the actual risk of such injury is very low per time or km exposure.

Australia, New Zealand & the United Arab Emirates are the only countries in the world with an all-age, enforceable bicycle helmet legislation

If it was such a good idea, why haven't other countries followed suit? For every academic paper that supports helmets or helmet legislation there is a competing academic paper that challenges the evidence.⁴¹ With such obvious scientific disagreement and lack of consensus, this is not the basis for good policy. Indeed, if this were a new pharmaceutical product it would be withdrawn promptly.

Recommendation

A rational and evidence-based approach to the repeal of mandatory helmet legislation would be to conduct a trial within one jurisdiction where it was not compulsory for adults to wear a helmet when

cycling, and to study over a number of years the impact on cycling participation and head/brain injuries. This would provide actual evidence for a policy decision, and reduces the emotional aspects of this topic.

I would recommend a partial repeal of the helmet legislation so that that it was legal for adults to not wear a helmet when riding on a bike path or lane, or in urban streets with 50km or less speed limit.

References

1. British Medical Association. *Cycling towards health and safety*. London: British Medical Association, 1992.
2. Roberts I, Owen H, Lumb P, et al. *Pedalling Health – health benefits of a modal transport shift*. Adelaide: University of Adelaide, 1996.
3. Cavill N, Davis A. *Cycling and Health: what's the evidence?* London: Cycling England 2007.
4. Bauman A, Rissel C, Garrard J, et al. *Cycling: Getting Australia Moving – Barriers, facilitators and interventions to get more Australians physically active through cycling* Melbourne: Cycling Promotion Fund 2008.
5. Hamer M, Chida Y. Active commuting and cardiovascular risk: a meta-analytic review. *Prev Med* 2008;**46**(1):9-13.
6. Oja P, Titze S, Bauman A, et al. Health benefits of cycling: a systematic review. *Scand J Med Sci Sports* 2011;**21**:496-509.
7. British Medical Association. *Healthy transport = Healthy lives* London: British Medical Association (Last accessed December 6, November 2012, <http://bma.org.uk/transport>), 2012.
8. Garrard J, Rissel C, Bauman A. Health benefits of cycling. In: Pucher J, Buehler R, eds. *City Cycling*. Cambridge, Massachusetts: MIT Press, 2012:31-55.
9. Curnow WJ. The Cochrane Collaboration and bicycle helmets. *Accident Analysis & Prevention* 2005;**35**:287-92.
10. Robinson DL. No clear evidence from countries that have enforced the wearing of helmets *BMJ* 2006;**332**:722e5.
11. Clarke CF. Evaluation of New Zealand's bicycle helmet law. *The New Zealand medical journal* 2012;**125**(1349):60-9.
12. Robinson DL. Head injuries and bicycle helmet laws. *Accident; analysis and prevention* 1996;**28**(4):463-75.
13. Elvik R. 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* 2011;**43**(3):1245-51.
14. Land Transport New Zealand. *Sustainable and safe land transport – trends and indicators*. <http://www.cycle-helmets.com/nz-ltsa-2006.pdf>. (Last accessed 20/5/2010). Wellington: Land Transport New Zealand, 2006.
15. Sandblom E. What happens when you mandate helmet-wearing among young Swedish cyclists? . Secondary What happens when you mandate helmet-wearing among young Swedish cyclists? 2014. <http://www.ecf.com/news/what-happens-when-you-mandate-helmet-wearing-among-young-swedish-cyclists/>.
16. Dennis J, Ramsay T, Turgeon AF, et al. Helmet legislation and admissions to hospital for cycling related head injuries in Canadian provinces and territories: interrupted time series analysis. *BMJ* 2013;**346**:f2674.
17. de Jong P. The health impact of mandatory bicycle helmet laws. *Risk Analysis* 2012;**32**(5):782-90.
18. Sieg G. Costs and benefits of a bicycle helmet law for Germany. Working Paper No. 21. Münster: Institute of Transport Economics Münster, 2014.

19. Henley G, Harrison JE. Serious injury due to land transport accidents, Australia 2006-07 Canberra: Australian Institute of Health and Welfare 2009.
20. Parker A. Unsustainable trends in the Australian Census data for the journey to work in Melbourne and other cities in Victoria. 27th Australasian Transport Research Forum. Adelaide, 2004.
21. New C, Rissel C. Cycling to work in Sydney: analysis of journey-to-work Census data from 2001 and 2006 Liverpool: Health Promotion Service, Sydney South West Area Health Service 2008.
22. Gillham C, Rissel C. The growth of cycling has not matched population growth in Australia: a comparison of 1985/86 and 2011. *World Transport Policy and Practice* 2012;**18**(3):5-12.
23. Cycling Promotion Fund. Riding a Bike for Transport - 2011 Survey Findings. Secondary Riding a Bike for Transport - 2011 Survey Findings 2011.
<http://www.cyclingpromotion.com.au/images/stories/MediaReleaseDocs/CyclingPromotionFundRidingaBikeforTransportSurveyReport2011.pdf>.
24. Rissel C, Wen LM. The possible effect on frequency of cycling if mandatory bicycle helmet legislation was repealed in Sydney, Australia: a cross sectional survey. *Health Promotion Journal of Australia* 2011;**22**(3):178-83.
25. Pucher J, Dill J, Handy S. Infrastructure, programs, and policies to increase bicycling: an international review. *Prev Med* 2010;**50** Suppl 1:S106-25.
26. Hillman MC. Cycling: towards health and safety London British Medical Association 1992.
27. Woodcock J, Edwards P, Tonne C, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport *Lancet* 2009;**374**:1930-43.
28. de Hartog JJ, Boogaard H, Nijland H, et al. Do the health benefits of cycling outweigh the risks? *Environ Health Perspect* 2010;**118**(8):1109–16.
29. Rabl A, de Nazelle A. Benefits of shift from car to active transport. *Transport Policy* 2012;**19**:121-31.
30. Rojas-Rueda D, de Nazelle A, Tainio M, et al. The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study. *BMJ* 2011;**343**.
31. Holm AL, Glumer C, Diderichsen F. Health Impact Assessment of increased cycling to place of work or education in Copenhagen. *BMJ Open* 2012;**2**(4).
32. Woodcock J, Tainio M, Cheshire J, et al. Health effects of the London bicycle sharing system: health impact modelling study. *BMJ* 2014;**348**:g425.
33. Fishman E. Evaluating the benefits of public bicycle schemes needs to be undertaken carefully. *British Medical Journal* 2011;**343**:d4521.
34. Jacobsen PL. Safety in numbers: more walkers and bicyclists, safer walking and bicycling. *Injury Prevention* 2003;**9**:205-09.
35. Komanoff C. Safety in numbers? A new dimension to the bicycle helmet controversy. *Injury Prevention* 2001;**7**:343–44.
36. Graves JM, Pless B, Moore L, et al. Public Bicycle Share Programs and Head Injuries. *American Journal of Public Health* 2014:e1-e6.
37. Fishman E, Washington S, Haworth N. Barriers and facilitators to public bicycle scheme use: A qualitative approach. *Transportation Research Part F* 2012;**15**:686–98.
38. Goldacre B, Spiegelhalter D. Bicycle helmets and the law. *BMJ* 2013;**346**:f3817.
39. Pucher J, Dijkstra L. Making walking and cycling safer: lessons from Europe *Transportation Quarterly* 2000;**54**:25-50.
40. Walter SR, Olivier J, Churches T, et al. The impact of compulsory cycle helmet legislation on cyclist head injuries in New South Wales, Australia *Accident Analysis and Prevention* doi:101016/jaap201105029 2011.
41. Robinson DL. Bicycle helmet legislation: can we reach a consensus? . *Accident Analysis and Prevention* 2007;**39**(1):86-93.

Appendix. Reductions in head injuries BEFORE helmet legislation

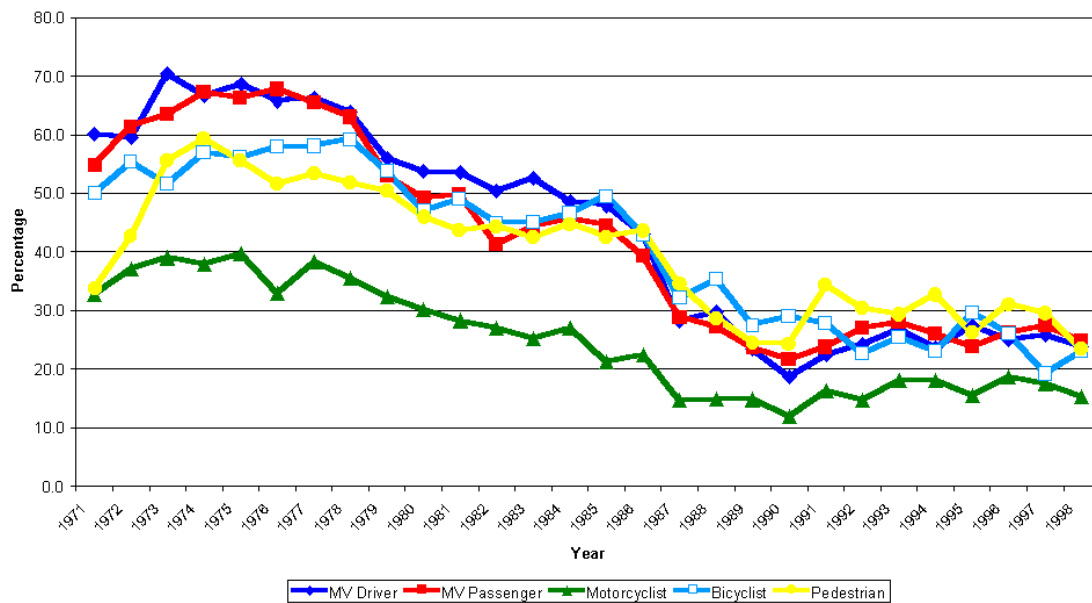
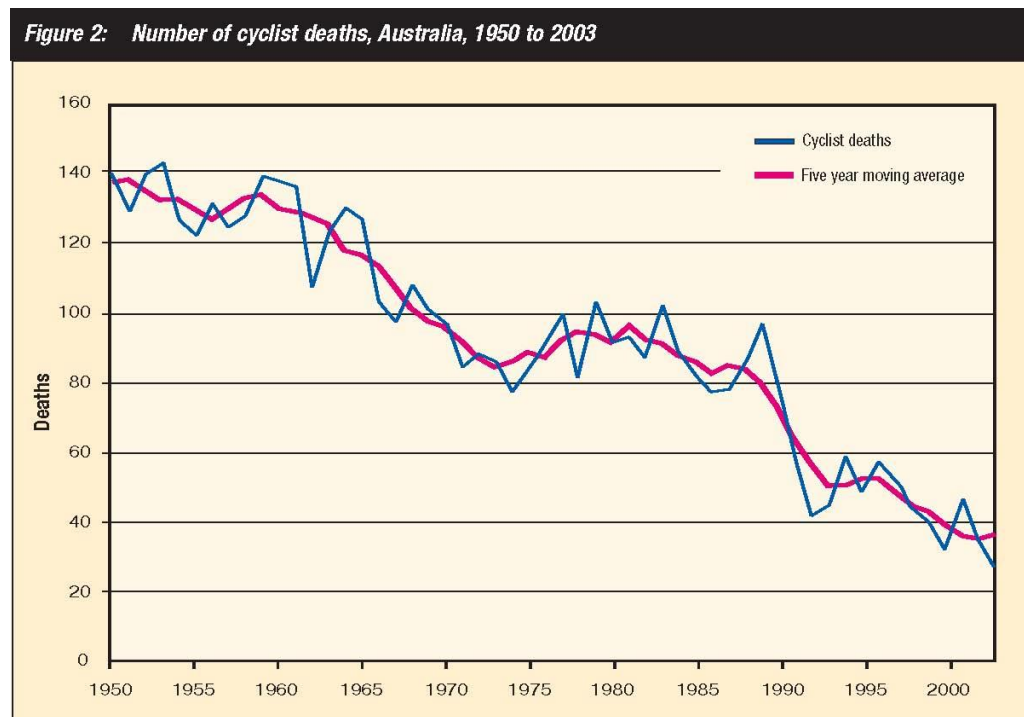


Figure 1: Percentage of injuries that are head injuries by road users, Western Australia, 1971 to 1998

Hendrie D, Legge M, Rosman D, Kirov C. **An economic evaluation of the mandatory bicycle helmet legislation in Western Australia.** Road Accident Prevention Research Unit, 1999.

<http://www.biketas.org.au/2008/20080404-3.pdf>



Australian Transport Safety Bureau. Monograph 17 *Cycle Safety*. 2004.

International trends 1970-2008 cycling fatalities

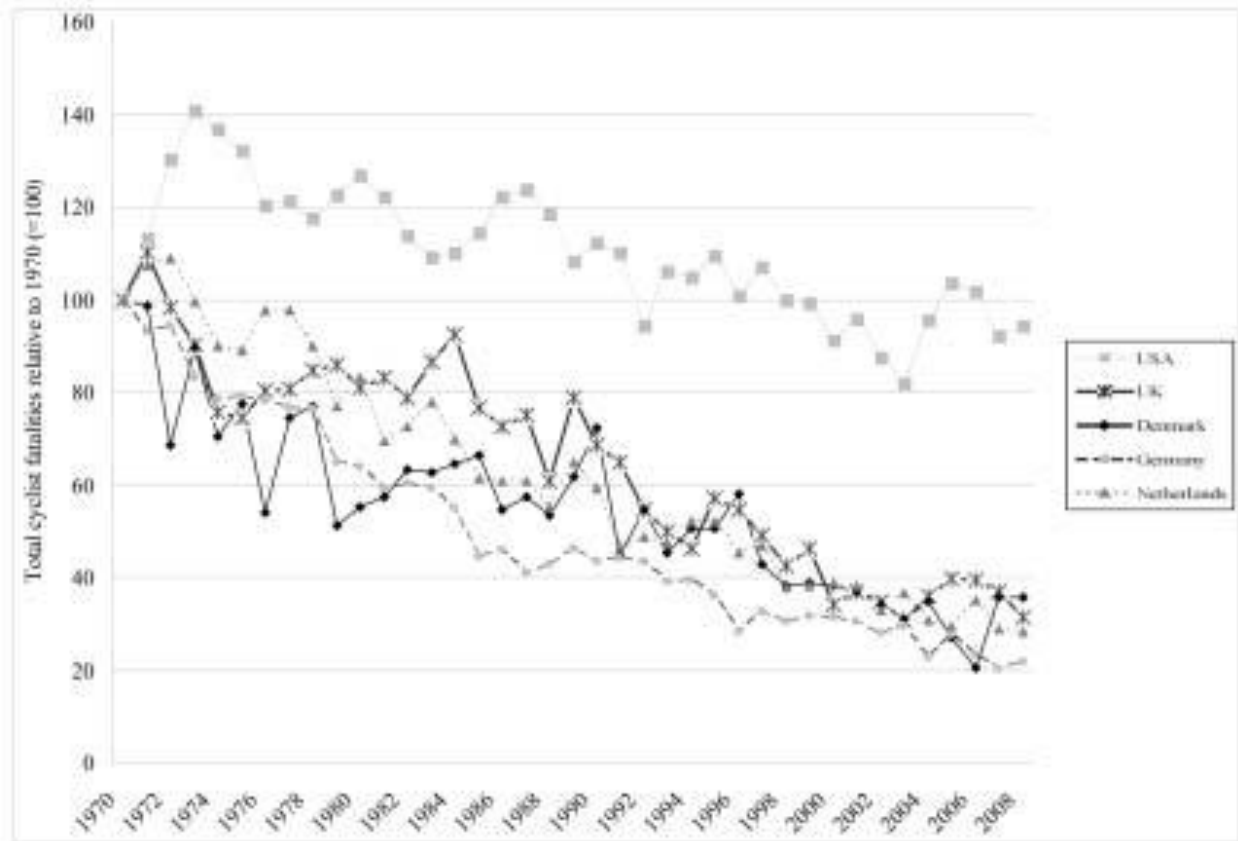


Figure 6. Trend in cycling fatalities in The Netherlands, Denmark, Germany, the United Kingdom and the USA, 1970–2008 (Percent relative to 1970 level). (Sources: IRTAD, 2010; Pucher and Dijkstra, 2000).