

An excellent summary of the present state of the literature on the effectiveness or harmfulness of bicycle helmets, taken from a recent Irish Medical Times: <http://www.imt.ie/>.

Dr Richard Keatinge says that at best helmets protect against a few, mostly minor, injuries. But, since he started looking at the evidence, he has not worn his.

On balance, cycle helmets do not show the benefits that some have claimed

I cycle regularly to my practice, partly to set a good example to my patients, partly to keep my middle-age spread at bay, but mostly because I enjoy it. There is good evidence for the health benefits of cycling and, anyway, without my spin, I would never hear the skylarks singing.

Three hours of ordinary commuter cycling per week - 15 minutes each way, perhaps three miles a day or 30 miles a week - reduced death rates by nearly half, about 40 per cent¹.

Even among keen sportsmen in this study, cycling reduced death rates². There are very few other interventions that can have such a dramatic effect on health.

Danger

My family worried about the danger on the roads. For careful riders the risk is real, but it is small. In England and Wales, one cyclist dies for every 23 million miles cycled.³

If I cycle 30 miles most weeks, for 50 years, I have one chance in 440 of dying as a result. That is not negligible, but it is many times less than the health benefits.

Common sense?

I bought a cycle helmet. It seemed obvious that it was a good idea. I wore it for a while. It was hot, heavy, and sweaty. I did not enjoy wearing it. I started looking at the evidence that cycle helmets actually do much good.

It is easy to find sales literature from helmet manufacturers⁴. It is also easy to find well-meaning enthusiasts who would like to save cyclists.⁵ Genuine evidence is difficult to extract, even from the professional literature.

Limited usefulness

Some hopeful figures are often quoted ("85 per cent" and up). They turn out to have a very poor scientific base. One early study compared helmeted children, mostly white, well-off, and cycling in parks, with unhelmeted children, mostly black, cycling in busy urban streets. The latter had more injuries, including head injuries. No amount of statistical manipulation can turn that sort of data into sound conclusions on the effect of helmets. Unfortunately, they have been widely quoted.

There are other and better case-control studies in the helmet literature, *eg.* Maimaris et.al.⁶ They are based only on cyclists presenting with injuries. In these studies, those who said they were wearing helmets were less likely to have injuries recorded to their heads.⁷

The odds ratios for protection are in the neighbourhood of 75 per cent. That sounds good. These papers often conclude that cycle helmets are a good thing, which should be encouraged or even made compulsory. However, there are words of caution to anyone reading these studies.

They often use the term "serious" head injury to mean anyone attending hospital, or admitted for observation overnight. In a sense that is correct; some of us have seen cyclists very upset, with scalp grazes and gashes, and a large proportion would be admitted to rule out intra-cerebral bleeding. But very few actually suffer any long-term effects, apart from increased wisdom.

More evidence is required to show that cycle helmets are useful in the real world. It should be possible to identify people who suffered serious injury, or death, that could have been prevented by helmets. And it should be possible to show, after a large increase in helmet wearing, that the proportion of head injuries has declined.

Deaths and design of helmets

In London, more than two-thirds of all cyclist deaths were due to collision with a heavy goods vehicle, 97 per cent with a motor vehicle of some sort.⁸ I have no access to post-mortem reports, but one may doubt that any helmet could save the majority of cyclists killed by a heavy goods vehicle.

Cycle helmets are not designed to protect against most serious impacts. Design standards involve dropping them from a height of a metre or so, directly onto a hard surface. The design intention is that the foam should compress, thus slowing deceleration of the head. Some of our patients may produce stories about damaged helmets, with the implication that the helmet has avoided a much worse problem. In fact, it requires very little energy to break a helmet, even to smash it. Most broken helmets have simply failed.

Controversy and wiggly lines

Cycle helmets arouse strong feelings and violent disagreements. In one study of trends in head injury, in a period when helmet use was increasing, we read: "The wearing of a cycle helmet is estimated to prevent 60 per cent of head injuries".⁹ However, another paper concludes that "increased helmet wearing percentages has had little association with serious head injuries to cyclists".¹⁰ Why are there such direct contradictions?

These studies are of trends in injury or death ratios over time. Such ratios vary considerably from year to year. In general, we cannot account in detail for most of the variations. Any statistician will point out that relatively rare events, such as cyclist deaths, will inevitably show considerable random variation from year to year. It can be easy to find an expected answer, merely by selecting the time period of the study, selecting the age-groups to be analysed, choosing the variables to be adjusted for, and so on.

At www.cyclehelmets.org there is a re-analysis of the data from one time-trend study. The original concluded that a helmet law had been "an effective road safety intervention". The re-analysis, over a longer time period, suggests strongly that any apparent benefit is an artifact.

Costs of encouraging helmets

Few studies make these explicit. But enforcement has costs. The most obvious one is the expense of helmets. As one enthusiastic retailer put it: "Just think, an accessory that isn't particularly cheap and that everyone has to buy". That, at least, can be calculated, and if it is a worthwhile expense, paid for by public funds.

But the main impact on health would come from an effect on the numbers of people cycling. Even a small decline in the numbers cycling would do more harm than preventing all injuries to cyclists.

To repeat, cycling is good for health. It does far more good than associated injuries do harm.

The work reviewed at www.cyclehelmets.org strongly suggests that overall, cycling in Australia declined by about a third after a helmet law was passed. This would be enough to make the law extremely bad for health, even if it prevented all injuries to cyclists.

There are other worrying possibilities, including the likelihood that the law may increase risk to the remaining cyclists.¹¹

It has been suggested that "just one" serious injury saved would be enough to justify any amount of cost. No economist would agree. But no health worker should agree either. The costs are not only money, but are people dying with the consequences of insufficient exercise. With the present political worries about obesity, politicians too may think it unwise to criminalise people out for a healthy ride.

Compulsion

Some countries have forced cyclists to wear helmets or stop cycling. A full analysis of the natural experiments provided by these laws would be difficult. It should include head injuries and other injuries, to cyclists, pedestrians, and other road users, in relation to the amount of time they spend on the roads. It should analyse these over a long time-period, using as potential explanatory variables not only changes in helmet use, but also road safety initiatives. And it should include costs.

In particular, putting people off cycling is a threat to health far greater than any possible benefit that helmets could provide.

I have not found any comprehensive analysis of these factors in the literature. In many cases, laws appear to have been declared a success without serious evaluation. But some figures are available. A graph¹² shows some figures from Western Australia, which made cycle helmets compulsory in 1991. It is not clear why the ratio of head injury among pedestrians showed changes around the time of a helmet law. Nor is it clear why there is a downward trend for all groups over most of this period. But there is certainly no obvious benefit from the helmet law.

There are few reasonably thorough analyses of helmet laws and some of the best attempts may be found at www.cyclehelmets.org and www.cycle-helmets.com. But, if the case-control studies are a good guide to what happens in real life, the benefits should be obvious. There are no obvious benefits. It is necessary to indulge in disputable selection of the data in order to show any useful effect on any parameter. On balance, and admitting that the evidence is often unsatisfactory, cycle helmets do not show the benefits that some have claimed.

To wear?

Since I started looking at the evidence, I have not worn my helmet. If I am worried about my health, I should get on my bike. If I am worried about accidents, I would follow the advice in *Cyclecraft*.¹³ If I am worried about my patients' health, I tell them to consider how they could use a bike in their daily lives, to listen to the skylarks again, and wear a helmet if they actually want to.

To compel?

At best, cycle helmets protect against a few, mostly minor, injuries. At worst, and especially when enforced, they contribute to the obesity epidemic.

The evidence suggests that helmet laws are bad for health. In a world which bombards politicians with complicated and worrisome issues, here is one with a simple resolution - ignore cycle helmets. There is much that can be done to make cycling a safer and commoner choice. Helmets are not a useful part of that process.

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¹ Andersen LB, Schnohr P, Schroll M, Hein HO, All-Cause Mortality Associated With Physical Activity During Leisure Time, Work, Sports, and Cycling to Work. *Arch Intern Med*. 2000; 160:1621-1628).

² Prof Andersen, pers.com.

³ Passenger death rates: by mode of transport 1981-1999: Social Trends 31. www.statistics.gov.uk).

⁴ www.bellbikehelmets.com.

⁵ www.bhit.org.

⁶ Maimaris C, Summers CL, Browning C, Palmer CR. Injury patterns in cyclists attending an accident and emergency department: a comparison of helmet-wearers and non-wearers. *BMJ* 1994;308: 1537-40.

⁷ Thompson DC, Rivara FP, Thompson R. Helmets for preventing head and facial injuries in bicyclists (Cochrane Review). In: *The Cochrane Library*, Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.

⁸ Gilbert K, McCarthy M. Deaths of cyclists in London 1985-92: the hazards of road traffic. *BMJ* 1994;308:1534-1537.

⁹ Cook A, Sheikh A. Trends in serious head injuries among English cyclists and pedestrians. *Injury Prevention*. 9(3): 266-7, 2003.

¹⁰ Scuffham PA, Langley JD. Trends in cycle injury in New Zealand under voluntary helmet use. *Accident Analysis & Prevention*. 29(1):1-9, 1997.

¹¹ Wardlaw M. Three lessons for a better cycling future. *BMJ* 2000;321:1582-5.

¹² www.cyclehelmets.org

¹³ Franklin J, HMSO, *Cyclecraft*, 1997.