

# Cycle helmets: 25 years along the road

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## Introduction

Cycle helmets have been around for about a quarter of a century. This paper looks at what they have achieved during that time in the real-world, and seeks to answer the question: Whose gain?

## History

Cycle helmets were first introduced in America in the mid 1970s. At first they were promoted mainly by their manufacturers, who were often not afraid to denounce competitors' products as ineffective and bad for health.

During the 1980s reports began to appear, particularly in the medical press, suggesting that if cyclists wore helmets, they would be less likely to suffer head injury. From that time, the promotion of helmet wearing by cyclists has been a made thrust of road safety campaigns in many countries.

## Research

I am not a doctor or health professional, but over the past few years I've studied helmet research extensively. I know that even people with the highest medical qualifications are not infallible, and they frequently find it difficult to judge the real-world impact of cycle helmets.

Dozens of research papers have been published. Most have predicted large savings in life and injury. With many papers predicting reductions in fatalities and serious injuries of 80 - 90 per cent, it's not surprising that so many people are keen to promote helmet use.

But even in the early days, there were less optimistic findings. Rodgers (1988) analysed data on all 8 million injuries to cyclists in the USA over 15 years and concluded not only that there was no evidence that hard-shell helmets had reduced head injuries or fatalities, but moreover that fatalities were more likely amongst cyclists that wore helmets.

Spaite (1991) found that although unhelmeted cyclists often had more severe injuries, this was true for all parts of the body, suggesting that cyclists who wear helmets voluntarily might ride more cautiously.

There has been no original research into the effectiveness of helmets for the UK Government or by the Transport Research Laboratory (TRL). In 1994 TRL undertook a literature review, most of which supported cyclists wearing helmets. TRL also undertakes on-going research into helmet use and

attitudes, which has shown, for example, a strong link between helmet promotion and people being deterred from cycling.

A limited amount of independent research has taken place in Britain. Addenbrooke's Hospital (1994) recorded 1,040 cycling casualties, 114 of whom had worn helmets. They concluded that unhelmeted cyclists were 3¼ times more at risk. On the other hand Kennedy (1996) found that at least 50 per cent of cyclist fatalities in Sheffield and Barnsley would not have been saved by helmets, and 13 times as many car occupants and pedestrians might benefit from helmets as cyclists.

## **Helmet laws**

The promise of enormous savings in injury has led to the promotion of helmet wearing in most western countries, with many people feeling justified in seeking compulsion.

Certain US counties and states were the first to introduce laws, mostly for children. Australia had the first national laws (1990 - 92), followed by New Zealand (1994). British Columbia, Canada introduced a law towards the end of the 1990s, and Spain is in the throes of implementing one in 2000.

One great advantage of helmet laws is that they provide whole-population samples for research, eliminating many of the biases inherent in the small-sample surveys typical of early helmet research. It is possible to compare the behaviour of the same people, first without, and then with, helmets.

In Australia the most immediately noticeable effect of the law was a dramatic drop in people cycling. This was no mere blip; a decade later, numbers in Western Australia are still 15 to 20 per cent down despite population increases.

Nonetheless, early studies claimed success, reporting a large reduction in head injuries. But they ignored the concurrent decline in head injuries amongst all road users and the effect of the fall in cycle use. This led to a period of conflict between official and independent research, particularly regarding relative risk.

But in November 1999, the Road Accident Prevention Research Unit issued a report that conceded much of its former position. Having taken account of the general decline in head injuries, it now estimates no more than an 11 per cent decrease in the absolute number of head injuries - significantly less than the decline in cycling. The risk per cyclist has increased.

The Accident Research Unit also reported on the cost-effectiveness of boosting helmet use. It estimated a financial loss of up to \$10 million, and that's without taking into account many substantial costs, such as those associated with reduced cycling activity.

In New Zealand the experience has been similar: Cycle use declined; the proportion of serious head injuries remained unchanged; there was some reduction in mild concussions and lacerations (which are minor injuries), but an increase in neck injuries (which can be serious). Helmet promotion was found not to have been cost-effective.

In the USA, another researcher followed Rodgers and found no detectable 'helmet-effect' in US cycling fatalities over a period when helmet use rose from close to zero to over 30 per cent. Where cycle laws were introduced, they led to less cycling, and initial gains in injury reduction have generally been lost in 1 - 2 years. Many people put the injury reduction down more to less cycling than to the effectiveness of helmets. California has the most cycling, but had no decrease in injuries.

In Canada, too, there has been a similar story - no reduction in fatalities over the existing trend during a period when helmet use rose from zero to 50 per cent.

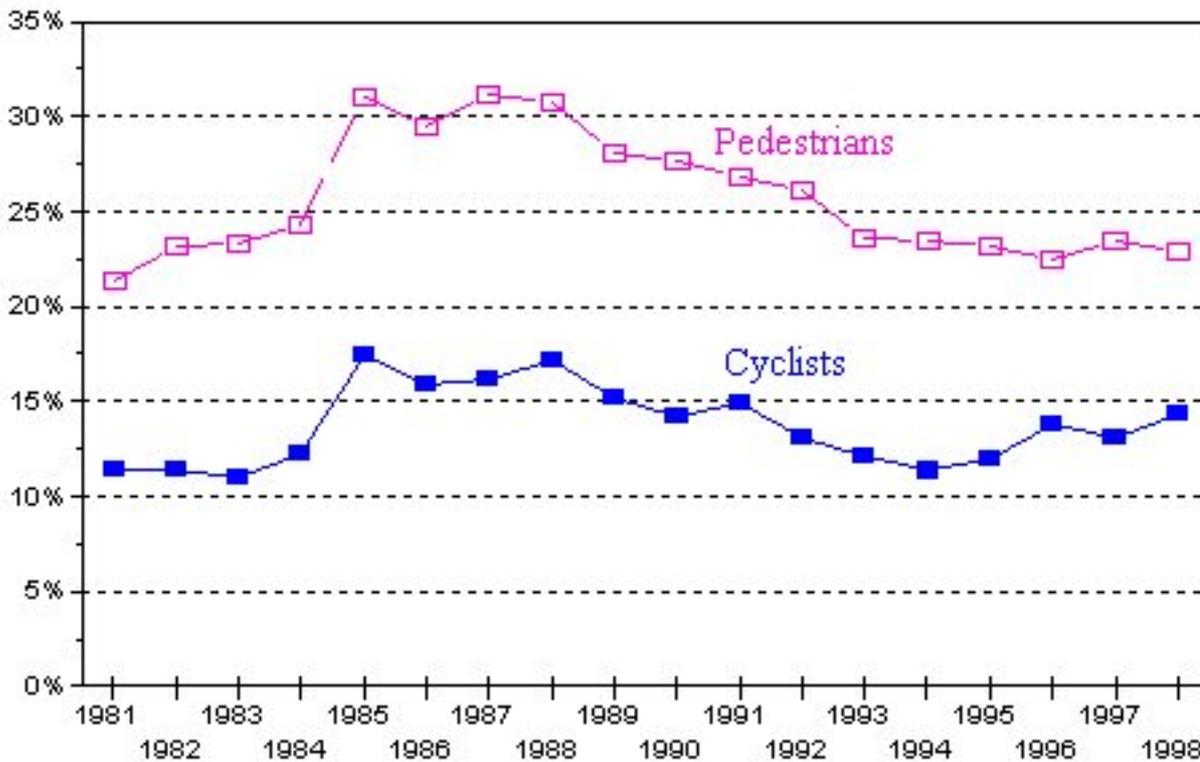
## **Greater London**

In Britain, it is worth looking at trends in Greater London. Helmet use was rare before the mid 1980s, but increased steadily from about 1986. Around 40 per cent of cyclists wore a helmet by 1996. Cycle fatalities, on the other hand, have maintained the same trend since the late 1970s. Serious injuries also show no helmet-effect.

The raw statistics take no account of the amount of cycling, although the variance is small compared with the rise in helmet use. This is neutralised by considering severity ratio - the proportion of casualties that are serious or fatal. Again, there is no obvious influence of increased helmet use; indeed, the severity ratio increased during the period of greatest helmet take-up. Also, the trends for cyclists and pedestrians are a close match, yet pedestrian injuries are clearly not influenced by the wearing of helmets.

## Greater London injury severity ratio

Cyclists and pedestrians



## Mitigating factors

Nothing I have said so far, or intend to say, is *necessarily* a contradiction that cycle helmets *might* be a good thing. Although, for various reasons, the likelihood of preventing death is pretty remote, helmets may still be reducing the severity of injuries.

For this to be the case, however, when overall injury severities seem to be unaffected, there must be some other factor that is cancelling out any gains achieved through helmet wearing. However, if such a factor exists, then it is likely that it, too, is related to helmet use. Otherwise there would be proportionately better results in towns with high levels of helmet use compared with those with low use. This doesn't seem to be the case, although research is limited.

Furthermore, mitigating factors rarely cancel out the *full* effect of a significant change. Nor is it very likely that the same results would be seen in diverse countries.

For all these reason, the most likely explanation would seem to be that cycle helmets are simply not as effective as predicted. If that is the case, why not?

## Real-world shortfall

First it is important to realise that the most optimistic predictions were based on some very poor research. For example, the most cited research to this day, world-wide, has been Thompson's 1988

work in Seattle. Although purporting to be a straight comparison of helmeted and unhelmeted cyclists, it was actually a comparison of mostly white, middle-class, helmeted children riding largely in parks under the supervision of their parents, against mostly black, working-class unhelmeted cyclists riding alone on busy city streets. Thompson's data has been re-worked by McDermott , who reduced the original prediction of 85 per cent savings in fatalities and injuries, to 61 per cent, 40 per cent and then 25 per cent by successive restrictions of the data, the last result having the rider that reduction in serious injury was unlikely.

Helmets often prove uncomfortable to wear, and most people do not maximise the protection offered through correct fitting and keeping straps tight.

Few people know about the direct negative effects of helmets, but 6 children died in Sweden, and others in the USA, Canada and Finland, through strangulation when their helmets became caught. Ironically, although there is indisputable evidence of deaths caused *by* helmets, there is no such certainty about any lives that may have been saved.

But perhaps the most likely reason for the real-world shortfall is that helmets are more limited in their capabilities than is often assumed.

## **Helmets limitations**

The design and testing of cycle helmets is simplistic, impact tests usually consisting of simple falls onto an anvil. They really only mimic simple, low-speed falls.

In particular, helmets are neither designed nor tested to mitigate angular acceleration impacts, that lead to rotation of the head, which many doctors believe to be the cause of more serious injuries.

Australian research on football helmets has suggested that helmets can increase injury severity by changing glancing blows into rotational ones.

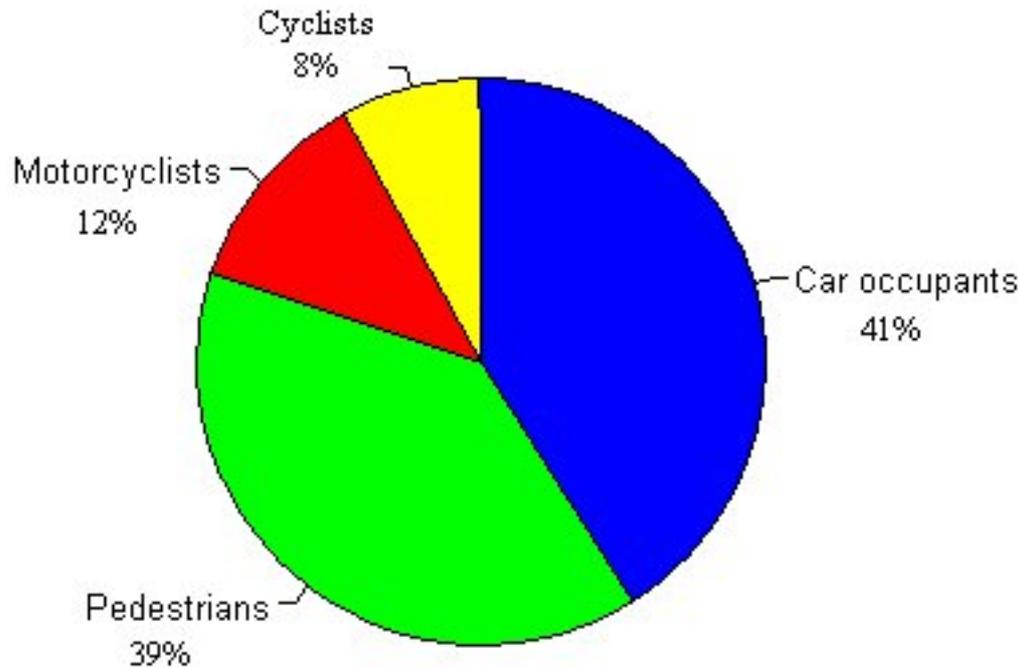
Helmet standards are on the decline. Partly in response to helmets strangling children, buckles have been re-designed to release under load, which makes it more likely that a helmet will fly off in a collision.

Yet despite this fall in standards, most helmets on sale do not meet them. In 1998, 16 out of 24 helmets tested by the Consumers Association failed the European standard, only 2 helmets met the more demanding Snell standard, and one of those caused some impairment of a cyclist's vision.

Despite these shortcomings, the public is regularly led to believe that helmets afford significant protection.

## **Head injuries in perspective**

If that sounds gloomy, we should take care to keep head injury when cycling in perspective.



Other road users suffer many more head injuries than cyclists, and still more occur in the home and at work. Cyclists, on average, live longer than non-cyclists with healthier lives, and serious injury is likely only once in 80 lifetimes.

Helmets for motorists are now available in Australia. They are said to be more effective than cycle helmets, and better than air bags, interior padding or seat belts. If helmets are so beneficial, it is illogical to think of wearing a helmet only on a two-wheeled vehicle.

## Helmets and civil law

Nonetheless, there are powerful forces taking advantage of the perception that it is irresponsible not to wear a cycle helmet.

I am not a solicitor or legally-qualified. However, I do work from time to time with solicitors and the courts as an Expert Witness after accidents to cyclists.

So far I have been involved in 3 cases where cyclists were accused of contributory negligence through not wearing a helmet, and I know of 2 others. Indeed, my involvement in helmet research came through a report I had to prepare for court - previously I was doing my best to keep away from a clearly controversial subject! In one of my 3 cases, I was engaged for the insurance company seeking to prove negligence, which was a good way to force me to consider all sides of the debate.

It is important to realise that, to my knowledge, no UK court has yet declared that it is negligent not to wear a cycle helmet. Indeed, in two cases judges have made passing comment that suggested they would not be sympathetic to such a claim. Also, senior doctors usually do not like to be pinned down about the value of a helmet in a specific case (although less well-qualified people may be less inhibited).

Yet very many cyclists accept reduced compensation for fear that they are guilty of negligence, frequently losing thousands of pounds as a result. Of course, insurance companies rely on this. In general, cyclists should not be so afraid, especially in the absence of strong medical evidence against them.

## **Whose gain?**

So whose gain are helmets?

There may be instances when helmets give useful protection to an individual cyclist. But the odds seem to be against it! And for no overall societal benefit, there must be times when other cyclists are losing. If you ride less carefully, or less often, or accept reduced compensation for a crash that was not your fault, you will also be losing out. So for the individual cyclist, it's hard to see a clear overall advantage.

Amongst the public generally, there is clear evidence that the promotion of cycle helmets is scaring many people from cycling, which leads to many community losses, especially in health. From a cost-benefit point of view, too, the promotion of helmets does not appear to be public money well spent. So there is no clear benefit to the community at large.

Insurance companies, on the other hand, are clear winners.

