Do cycle helmets prevent serious head injury?

Cycling without helmets

Mark McCarthy

The argument over whether cycle helmets prevent bicyclists from serious head injury continues. We asked Mark McCarthy and Cynthia Illingworth to put the case for and against. Helen Trippe also weighs the arguments in her editorial (p 843).

There are three facts to emphasise about cycling: it is safe; it is green; and it is healthy.[1] Police statistics for Great Britain in 1990 show that car drivers had 218 549 accidents, in which they killed 1199 pedestrians, 131 cyclists, and 1647 car users and severely injured 12 852 pedestrians, 3028 cyclists, and 19 466 car users.[2] In contrast pedal cyclists had 28 336 accidents in which they killed 3 pedestrians and seriously injured 134 pedestrians and cyclists. Car drivers kill; cyclists are safe.

Leading medical journals have called for pedal cyclists to wear helmets because head injury is the commonest cause of death in road accidents.[3,4] The main scientific study of cycle helmets was undertaken in five hospitals in Seattle.[5] Cyclists with head injuries were compared (unmatched) with cyclists attending for other injuries. Seven per cent of the head injured cyclists wore helmets compared with 20% of the controls. But the study's serious flaw was that it did not discount the possibility that the cyclists with head injuries were very different from those with other injuries. An observational study in the same city showed that children wearing helmets were much more often white than black, riding in parks and on bicycle paths than on city streets, and riding with adults rather than riding alone.[6] Without proper matching for risk taking behaviour, the hospital study is useless as policy guidance.

False security

An analogy can be drawn between helmets for cyclists and filters in cigarettes (nowadays somewhat out of fashion): they have an apparent plausibility of protection, giving comfort to user and manufactuer alike, but have little benefit. Helmets may lessen direct compression but do not protect the brain from rotational trauma. The British Standard 6863 for cycle helmets protects "only when the rider falls onto the road without other vehicles being involved."[7] But cyclists usually die from being hit by a car. Even wearing helmets, more motor cyclists die of head injuries than pedal cyclists, and pedal cyclists' helmets are not as strong as those of motor cyclists. If policy makers really believe in helmets all pedestrians and car users should be required to wear them, since many more of these groups die of head injuries than pedal cyclists.

Apart from being safe, cycling gives both cardiovascular and mental health benefits, as shown by Dr Mayer Hillman in the British Medical Association's excellent new book *Cycling: Towards Health and Safety*.[8] Motor vehicles, on the other hand, are a major cause of air pollution.[9] Town planners agree. Architect Richard Rogers recently called us to regain our towns and cities for living without cars because they create environmental and visual pollution, endanger other travellers, and reduce exercise.[10] To encourage fitness we must give precedence to walking and cycling; provide excellent public transport for longer journeys; and make substantial reductions in car use.[11]

The vested interests against this policy will be substantial: the road lobby is powerful and insidious.[12] Much of Britain's economy is based on subsidised, cheap, yet lethal road transport. Last year the world

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ADAM HINTON/SELECT

Removing the danger from cars would be more effective than wearing helmets

went to war over petroleum. Yet, if in the 1960s, 1970s, and 1980s we have come to recognise the dangers of addiction to cigarettes, drugs, and alcohol and begun to seek to reduce their use, in the 1990s we must acknowledge the price, in deaths, disability, and environmental damage, of our global addiction to petrol.

Cycle helmets do not improve safety but place responsibility for injury protection on the victim. As with smoking, the preferred public health policy would be to seek to remove the cause.

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The argument for helmets

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Exact numbers of injuries to cyclists in Britain are impossible to obtain but may be as high as 100 000 a year. In 1985 296 pedal cyclists were killed.[1] In the United States more than 1200 deaths related to bicycle accidents occur each year, about half of which are in children.[2]

Occurrence of head injuries

In studies of bicycle accidents at Sheffield Children's Hospital between half and three quarters of the children had injuries above the neck.[3-6] In Calgary, Alberta, a study showed that more than two thirds of admissions after bicycle accidents were because of head injury.[7] Similar findings were reported at the Children's Hospital, Philadelphia.[8] Deaths after bicycle accidents are nearly always caused by head trauma.[9]

Any accident in which a child falls head first over the handle bars is potentially dangerous. Twenty three of 100 riders of BMX bicycles whom I studied had done this. Head injuries which at first seem to be minor may later prove more serious or lead to sequelae which may affect the child's education or have a profound effect on the family.

Can helmets help?

It is difficult to compare the effect on a model headform with that on a human head, but if damage to the headform is reduced it is reasonable to assume some increased protection for the human.

At present the use of helmets in Britain is comparable with use of seat belts in cars before they became mandatory. Their use is increasing, largely due to the efforts of road safety officers, whose enthusiasm and ingenuity in devising low cost schemes through schools and retailers have greatly increased sales. Fewer than 10 000 helmets were sold in Britain in 1989; in 1991 sales rose to a million; some schemes have methods of retrieving helmets worn in accidents and getting information about the circumstances and the injuries sustained. In 1991 at least 30 children in Sheffield were almost certainly saved from serious injury through wearing helmets. (T R Smith, personal communication).

An important study into the effectiveness of helmets was made in Seattle in 1989.[11] Of 99 patients with head injuries, only four wore helmets. They found that helmets reduced the risk of head injury by 85%.

Over three years in one hospital in New South Wales there were 37 serious injuries and six deaths in 251 children admitted after a bicycle accident. None of those seriously injured or killed had been wearing a helmet and analysis suggested that helmet wearing would have been beneficial in 76% of those seriously injured and in five of the children who died.[12]

PAUL HARRIS/SELECT

Deaths after bicycle accidents are nearly always caused by head injuries

Williams studied the performance of helmets in bicycle accidents in Melbourne in 1989.[13] Of 432 cyclists wearing a helmet at the time of an accident, 64 had sustained an impact to the helmet. When the helmet stayed on the head and was not defective, no serious head injuries occurred despite some severe impacts. Serious head injuries and skull fractures happened when the helmet came off the head or if it was defective.

Increased use, fewer deaths

In Stockholm, after several campaigns, the proportion of cyclists wearing helmets rose from 8% in 1986 to 16% in 1988.[14] The authors of that report concluded that although it was difficult to show

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