

Bicycle Helmet Legislation: Evidence for Effectiveness

A review of: LeBlanc JC, Beattie TL, Culligan C 2002 Effect of legislation on the use of bicycle helmets. *Can Med Assoc J* 166:592–595

CHILDREN USE BICYCLES for transportation, recreation, and exercise. Bicycling, however, is not without risk. Each year in the United States, there are on average 380 deaths and 450,000 emergency department visits because of bicycle injuries among children 0–19 years (1). Head injuries account for 64% of these deaths and 31% of the emergency department visits. In general, injury prevention strategies encompass education, environmental modification, engineering, and legislation. For example, prevention of bicycle injuries may include safety instruction (education), separate bicycle lanes (environment), bicycle helmets (engineering), and bicycle helmet laws (legislation).

A systematic review published by the Cochrane Collaboration (an international organization that promotes evidence-based health care) assessed the evidence for the effectiveness of bicycle helmets in preventing head injuries (2). The review identified five well designed case-control studies on the topic. Data from these studies showed that for bicyclists involved in crashes, bicycle helmets reduced the risk of head and brain injury by 85% and 88%, respectively.

A recent study by LeBlanc *et al.* evaluated the effectiveness of bicycle helmet legislation (3). Over a five year period, observational data on helmet use in an urban Canadian setting were collected. Bicycle helmet use increased from 36% pre-legislation to 84% post-legislation. In addition, the proportion of injured cyclists (0–19 years) with head injuries fell from 3.6% to 1.6% over the same time period. Other observational studies from around the world have shown that bicycle helmet use by children increases following the introduction of helmet legislation (4).

Helmet use, however, is only an intermediate step in the injury prevention pathway. In other words, while behavior change is important, the key outcome for any injury prevention intervention is the

injury rate. In this context, the Cochrane Collaboration systematic review also identified several ecologic studies that demonstrated a significant decline in the bicycle head injury rate following the introduction of bicycle helmet legislation (2).

Some authors have argued, however, that bicycle helmet legislation may lead to adverse public health consequences (5). For example, adherents to the “risk compensation” hypothesis have suggested that bicycle helmets may make riders feel protected and thus encourage greater risk taking by cyclists. In other words, mandatory helmet use could potentially increase the bicycle injury rate. The evidence, however, does not support this argument. For example, studies in different countries have demonstrated that bicycle head injury rates decline following the introduction of bicycle helmet legislation (2). In addition, repeal of motorcycle helmet laws in the United States was associated with a subsequent increase in motorcycle fatality rates, compared with fatality rates when helmet use was mandatory (6).

Whether the introduction of helmet legislation causes children to stop riding their bicycles is contentious. For example, data from Australia showed a decline in the number of adolescent cyclists in the 2 years following bicycle helmet legislation (5). Based on these data, opponents of helmet legislation have argued that reduced exposure to cycling by children (because of helmet legislation) will reduce the fitness level of the population and thereby increase the likelihood of cardiovascular disease. Longitudinal, observational data from Canada, however, showed that the number of child cyclists increased in the

three years following the introduction of helmet legislation (7). Population-based research on the effect of helmet legislation on cycling exposure is needed. With respect to fitness levels and cardiovascular disease, there is no evidence that children who stop cycling post-legislation (if indeed they do) were maintaining their fitness level through cycling. Furthermore, children who stop riding their bikes may replace cycling with other sporting or recreational activities that enhance fitness.

In conclusion, the evidence suggests that bicycle helmet legislation increases helmet use and decreases the frequency and severity of bicycle injuries in children. As for most injuries, a combination of education, environmental change, engineering, and legislation is needed to reduce the burden of childhood injury.

1. Sosin D, Sacks J, Webb K 1996 Pediatric head injuries and deaths from bicycling in the United States. *Pediatrics* 98:868–870
2. Thompson DC, Rivara FP, Thompson R 2000 Helmets for preventing head and facial injuries in bicyclists. *Cochrane Database Syst Rev* CD001855
3. LeBlanc JC, Beattie TL, Culligan C 2002 Effect of legislation on the use of bicycle helmets. *Can Med Assoc J* 166:592–595
4. Rivara FP, Thompson DC, Patterson MQ, Thompson R 1998 Prevention of bicycle-related injuries: helmets, education, and legislation. *Annu Rev Public Health* 19:293–318
5. Robinson D 1996 Head injuries and bicycle helmet laws. *Accid Anal Prev* 28:463–475
6. Evans L 1994 Cycle helmets and the law. *BMJ* 308:1521–1522
7. Macpherson A, Parkin PC, To T 2001 Mandatory helmet legislation and children's exposure to cycling. *Inj Prev* 7:228–230

*Division of Paediatric Medicine (Paediatric Outcomes Research Team)
Department of Paediatrics
University of Toronto Faculty of Medicine
and Population Health Sciences
Hospital for Sick Children Research Institute
555 University Avenue
Toronto, Ontario
M5G 1X8
Canada*

DOI: 10.1203/01.PDR.0000035198.12622.BC