The effects of provincial bicycle helmet legislation on helmet use and bicycle ridership in Canada


Summary

This paper presents data on helmet wearing and cycle use from the Canadian Community Health Survey (CCHS) between 2000 and 2007.

The original abstract reads:

Results: Helmets were reportedly worn by 73.2% (95% CI 69.3% to 77.0%) of respondents in Nova Scotia, where legislation applies to all ages, by 40.6% (95% CI 39.2% to 42.0%) of respondents in Ontario, where legislation applies to those less than 18 years of age, and by 26.9% (95% CI 23.9% to 29.9%) of respondents in Saskatchewan, where no legislation exists. Though legislation applied to youth in both Ontario and Nova Scotia, helmet use was lower among youth in Ontario than among youth in Nova Scotia (46.7% (95% CI 44.1% to 49.4%) vs 77.5% (95% CI 70.9% to 84.1%)). Following the implementation of legislation in PEI and Alberta, recreational and commuting bicycle use remained unchanged among youth and adults.

Conclusions: Canadian youth and adults are significantly more likely to wear helmets as the comprehensiveness of helmet legislation increases. Helmet legislation is not associated with changes in ridership.

The authors therefore conclude that provincial helmet legislation in Canada has not led to the sharp declines in cycling that were seen in Australia and New Zealand following enforcement of cycle helmet legislation (Robinson, 1996; NZMT, 2008b).

The data presented do not support these conclusions. There are in fact sharp falls in cycling after legislation evident in the data, which the authors do not draw attention to. They also assume a causal relationship between legislation and helmet use, but this assumption is unsafe. Experience shows that helmet laws will only impact long term helmet use and cycling levels materially if they are enforced.

The authors' summary of evidence on helmet effectiveness is consistently biased towards studies supporting one view. Unreliable results from case-control studies are put forward whilst later population-level studies are ignored. The population-level studies showed no evidence of serious injury reduction due to mass helmet use. It is now recognised that the case-control studies that make up the Cochrane Review were seriously confounded by social factors.

The authors do present data showing that cycling is a safe activity, yet they fail to ask the obvious question: if cycling is not an unduly risky activity, why are bicycle helmet laws being passed at all?

Evidence presented

It is noted in the first paragraph that cycling is a popular physical activity in Canada, yet it causes only 2% of hospital injuries. This is good evidence that cycling is "safe" by the everyday standards of the word, and that cycle helmet promotion, let alone legislation, is disproportionate. The authors fail to recognise this point, yet it is fundamental to understanding whether cycle helmets are an appropriate response to those injuries that do occur.
The authors first present evidence to link helmet wearing rates with legislation. They take the examples of Nova Scotia, Ontario and Saskatchewan, respectively provinces with all-ages legislation, under 18's only and no legislation. Their analysis shows a progressive trend to higher rates of helmet use with more stringent legislation.

The limitations of the evidence should have been stressed. The authors are relying on self-reporting of helmet use in a survey based on telephone cold-calling. They do not draw on any data from street surveys, although these are available for several provinces. They do acknowledge in the discussion that self-reporting bias in legislation provinces could be an issue.

The authors make a serious error of logic by assuming a causal relationship between legislation and helmet use. Data not presented show that in Ontario, helmet use increased temporarily after the Under-18's law came into force in 1995, but after a few years returned to pre-law levels (Macpherson et al, 2006). The legislation was thus ineffective in altering helmet wearing rates in the long term. This might be because children cannot be charged for not wearing a helmet; only parents can be charged with permitting their children to ride without a helmet. The Toronto police never issued a single ticket for a helmet violation (Macpherson, 2004b) and indeed, beyond a temporary period of "stern warnings", ceased enforcing the law. So, at least with regard to child helmet laws, cause and effect between legislation and helmet wearing rates cannot be assumed since enforcement was not reliable.

The authors then study bicycle ridership, but in different provinces from helmet use: Prince Edward Island (PEI) and Alberta. This is an important shortcoming in their analysis, since they fail to show what effect helmet legislation had on wearing rates in those provinces. In addition to that problem, the ridership data presented in this section is particularly weak. Their ridership data are based on telephone surveys in which respondents were asked whether they had cycled in the last three months. If they had, they were classed as bicyclists. They were then asked how many times they had cycled in the last three months. This cannot be considered as robust data on ridership.

Although the authors claim that ridership was not affected by legislation, the data do not support such a conclusion. Indeed, the data are so poor as to be directly contradictory in some cases. For instance:

- For PEI Adults "number of riders" briefly increased after legislation but the number of trips dropped. It should be noted that the population of PEI is so small that robust data would in any case be hard to produce.

- In Alberta, youth "number of riders" was not much affected by the legislation, but youth "number of trips" dropped by half in the six years following the law. This cannot readily be dismissed as "no effect", but the authors ignore it in their general conclusion.

- In PEI, youth "number of riders" declined a little with legislation, while "number of trips" dropped about a third, but then recovered about five years later. This would be compatible with a temporary increase in helmet use with the passing of the law, as happened in Ontario.

Despite these contradictions in the data, the authors conclude "We did not find a significant reduction in bicycle use among youth or adults following the implementation of legislation and even found an increase in bicycle use among Alberta youth in the year immediately following the introduction of legislation".

This is not a fair summary of the evidence presented.

Evidence not presented

Evidence concerning helmet laws deterring cycling in Canada

Notwithstanding the conclusions of the authors, there is ample evidence in the literature that provincial helmet laws in Canada have reduced the amount of cycling. For example:

- Nova Scotia: all-ages legislation implemented from July 1997. On road counts before and after the legislation showed a decline in numbers of 40-60% (LeBlanc, Beattie and Culligan, 2002). Note: the authors of this paper have denied that their count data can be used to infer a drop in cycling. However, in their paper they state: "In
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1995/96, 1494 cyclists were observed on 17 days. In 1997, 636 cyclists were observed on 19 days. In 1998/99, 672 cyclists were observed on 13 days. Assuming their counting methodology was even vaguely systematic in terms of site, weather and time of day, their figures in fact strongly support a major drop in cycling having occurred with the enforcement of the law. Children showed a greater decline. Prior to the law, 8% of cyclists counted were children, but after the law the percentage fell to 4%. The rise in helmet use from (roughly) 40% to 80% shows that enforcement was in place at least at the time of the law. The number of cyclist casualties did not fall nearly as much as the decline of ridership, indicating an increase in risk per cyclist post law (this has been a common observation with helmet laws).

- Alberta: child helmet law came into effect in May 2002. Surveys in Edmonton showed that the percentage of children and adolescents amongst all cyclists fell by almost half (from 26% to 15%) between 2000 and 2004 (Hagel et al, 2006). This tallies remarkably well with the drop evident in the authors’ own data as noted above.

- British Columbia: all-ages legislation came into effect in September 1996. There are no on-street count data available, but the sharp reduction in cyclist casualties between 1995 and 1997 would lead one to infer a decline of about 30% in cycling. There was no improvement in head injuries to children as a result of the law (BHRF, 1103).

- Ontario: child helmet law introduced in October 1995. This law has been the subject of special study by a group of researchers in Toronto. It has been repeatedly asserted that the law did not deter child cyclists, without acknowledgement that there was only a temporary increase in helmet use. Due to lack of enforcement, helmet use declined back to pre-law levels within a few years. Contrary to the claims of the authors, there in fact was a decline in child cyclists in the years of high helmet use, with recovery after 1998 as helmet use fell (Macpherson, Parkin and To, 2001).

Evidence concerning the low risk in cycling

As already noted, the authors report that cycling is a popular activity in Canada, yet it causes only 2% of trauma admissions. One wonders why the authors failed to recognise the implications of that statistic. Clearly the risks of cycling are very low.

Risk in cycling was never studied at the time that helmet programmes began, in the 1970’s. Cycling was assumed to be dangerous because many prominent cyclists said it was dangerous. The assumption was repeated so often that it became accepted as fact. In recent years, researchers have analysed available evidence to produce risk assessments. These have been for Europe, where data on bicycle use is available in varying degrees. For instance, Britain has good cycle use data going back more than 40 years. The risk assessments show that utility and leisure cycling are low-risk activities. That is to say, typical risks faced by cyclists are between 0.3 and 0.5 fatalities per million hours’ use, which is within the range faced by drivers and pedestrians (Wardlaw, 2002). More intriguingly, since the early 1970’s, the risks of cycling have fallen just as much as the risks of driving have. This effect pre-dates helmet use, and in fact has been compromised by helmet use, since helmet programmes deter cycling. Reduced cycling means more risk per cyclist.

Cycling is certainly not a high risk mode of travel like riding a motorbike, except possibly in competition.

Evidence concerning the ineffectiveness of helmets

The authors cite the Cochrane Review of bicycle helmet effectiveness in support of the view that helmets are effective to prevent serious head injuries. They ignore studies carried out in Australia and New Zealand that found no evidence that mass helmet use had changed the risk of serious head injury in a crash (Robinson, 2006).

Citing only half the evidence reveals lack of rigour. In the case of cycle helmet effectiveness, the contradiction of the evidence can be explained. The early case control studies, such as those that make up the Cochrane Review, were confounded by social factors. A more detailed analysis is presented by the Transport and Health Study Group (THSG, 2011). The Cochrane Review results show a systematic error, although this has been overlooked by the proponents of helmets. In brief, those of lower social status are unlikely to wear a helmet but are most likely to
suffer serious head injury. This means that a natural helmet effect emerges simply from differences between social groups. In contrast, the failure of a whole population to see an improvement with 85% rate of helmet use is hard to explain away.

References

BHRF, 1103


Hagel et al, 2006


LeBlanc, Beattie and Culligan, 2002


Macpherson et al, 2006


Macpherson, 2004b

Communication concerning unpublished research by Dr A. Macpherson et al, School of Kinesiology and Health Science, York University, Toronto, Ontario, October 2004. .

Macpherson, Parkin and To, 2001


NZMT, 2008b


Robinson, 1996


Robinson, 2006

The Bicycle Helmet Research Foundation (BHRF), an incorporated body with an international membership, exists to undertake, encourage and spread the scientific study of the use of bicycle helmets. Also to consider the effect of the promotion and use of helmets on the perception of cycling in terms of risk and the achievement of wider public health and societal goals.

BHRF strives to provide a resource of best-available factual information to assist the understanding of a complex subject, and one where some of the reasoning may conflict with received opinion. In particular BHRF seeks to provide access to a wider range of information than is commonly made available by those that take a strong helmet promotion stance. It is hoped that this will assist informed judgements about the pros and cons of cycle helmets.

For more information, please visit www.cyclehelmets.org.