Executive Summary: Impacts of Mandatory Bicycle Helmet Legislation

Knowledge Synthesis
August 2015
Public Health Ontario

Public Health Ontario is a Crown corporation dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, frontline health workers and researchers to the best scientific intelligence and knowledge from around the world.

Public Health Ontario provides expert scientific and technical support to government, local public health units and health care providers relating to the following:

- communicable and infectious diseases
- infection prevention and control
- environmental and occupational health
- emergency preparedness
- health promotion, chronic disease and injury prevention
- public health laboratory services

Public Health Ontario's work also includes surveillance, epidemiology, research, professional development and knowledge services. For more information, visit www.publichealthontario.ca

How to cite this document:

Public Health Ontario acknowledges the financial support of the Ontario Government.

©Queen's Printer for Ontario, 2015
Authors

Erin Berenbaum, MSc
Research Coordinator,
Health Promotion, Chronic Disease & Injury Prevention (HPCDIP)
Public Health Ontario

Sue Keller-Olaman, MSc, PhD
Manager, Knowledge Synthesis Services (KSS)
Health Promotion, Chronic Disease & Injury Prevention (HPCDIP)
Public Health Ontario

Phat Ha, MPH
Research Coordinator,
Health Promotion, Chronic Disease & Injury Prevention (HPCDIP)
Public Health Ontario

Heather Manson, MD, FRCPC, MHSc
Chief, Health Promotion, Chronic Disease & Injury Prevention
Health Promotion, Chronic Disease and Injury Prevention (HPCDIP)
Public Health Ontario
Acknowledgements

Internal Reviewers

Justin Thielman, Epidemiologist, Public Health Ontario
Charoula Tsamis, Senior Research Facilitator, Public Health Ontario

Expert Advisors

Stacie Carey, Health Promotion Coordinator, Parachute Canada
Lorna Boratto, Public Health Nurse, Oxford County Public Health
Alison Macpherson, Associate Professor, York University
Stephanie Gower, Research Consultant, Toronto Public Health
Colleen Cooper, Public Health Nurse, Waterloo Public Health
Jacob Larsen, Senior Safety Research Advisor, Ministry of Transportation
Linda Yenssen, Manager, Ontario Injury Prevention Resource Centre
Charles Gardner, Medical Officer of Health, Simcoe Muskoka District Health Unit
Sue Shikaze, Health Promoter, Halliburton, Kawartha, Pine Ridge District Health Unit
Jackie Gervais, Health Promoter, Niagara Region Public Health
Monique Beneteau, Health Promoter, Peterborough County-City Health Unit
Robert Kyle, Medical Officer of Health, Durham Region Health Unit

External Reviewers

Alison Macpherson, PhD, Associate Professor, School of Kinesiology and Health Science, York University
Daniel Fuller, PhD, Assistant Professor, School of Public Health University of Saskatchewan

Special Thanks

Sarah Morgan, Library Technician, Public Health Ontario
Beata Pach, Manager, Library Services, Public Health Ontario
Domna Kapetanos, Library Operations Technician, Public Health Ontario
Disclaimer

This document was developed by Public Health Ontario (PHO). PHO provides scientific and technical advice to Ontario’s government, public health organizations and health care providers. PHO’s work is guided by the current best available evidence.

PHO assumes no responsibility for the results of the use of this document by anyone.

This document may be reproduced without permission for non-commercial purposes only and provided that appropriate credit is given to Public Health Ontario. No changes and/or modifications may be made to this document without explicit written permission from Public Health Ontario.
“With regard to the use of bicycle helmets, science broadly tries to answer two main questions. At a societal level, ‘What is the effect of a public health policy that requires or promotes helmets?’ and at an individual level, ‘What is the effect of wearing a helmet?’ Both questions are methodologically challenging and contentious.”

“The current uncertainty about any benefit from helmet wearing or promotion is unlikely to be substantially reduced by further research. Equally, we can be certain that helmets will continue to be debated, and at length. The enduring popularity of helmets as a proposed major intervention for increased road safety may therefore lie not with their direct benefits—which seem too modest to capture compared with other strategies—but more with the cultural, psychological, and political aspects of popular debate around risk”

*Goldacre & Spiegelhalter, 2013*
Background

Cycling is an affordable form of transportation that can improve cardiovascular fitness and reduce the risk of chronic diseases while also reducing traffic congestion, air and noise pollution, and greenhouse gas emissions. As with all modes of travel, cycling can involve collisions, which may cause injury and death. According to the Chief Coroner’s Report of 2012, between 2006 and 2010 there were 129 deaths among cyclists of all ages in Ontario, and of these, 74% were not wearing a helmet at the time of their fatal injury; however it is challenging to interpret this finding in the absence of other information such as the nature of the collision, etc. Legislation requiring all cyclists to wear helmets is thus seen as a potential intervention for preventing bicycle-related injuries and death, and the Chief Coroner’s Report includes a recommendation for the enactment of all-age legislation.

Although under Ontario’s Highway Traffic Act, helmets have been required since 1995 for all Ontario cyclists less than 18 years of age, the expansion of the law to include all ages is not universally supported. Some suggest that mandatory helmet legislation would have an overall positive impact on cyclists, increasing helmet use, and reducing risk of head injuries, without causing a reduction in cycling, and its associated benefits. Others are concerned that helmet legislation may have a negative impact, increasing cyclists’ risk compensation, discouraging cycling use and thus preventing associated health benefits, and that the costs of purchasing helmets to satisfy legislation may exceed any savings in reduced head injuries. Finally, there are those who, in disputing the effectiveness of the legislation as a prevention strategy, point to jurisdictions where cycling participation is high and the risk of cycling injuries is low in the absence of bike helmet legislation. This controversy suggests the need to evaluate the evidence regarding the effectiveness of bicycle helmet legislation and to further explore the possible mechanisms whereby bike helmet legislation contributes to outcomes in varied jurisdictional contexts.

Objectives

Given these varying perspectives, the primary objective of this synthesis was to evaluate the multiple impacts (e.g., health, economic, etc.,) of bicycle helmet legislation for cyclists (of all ages). The secondary objective was to explore, if possible, the context and mechanisms that may assist in explaining the differences in outcomes observed across jurisdictions.

Methods

Nine databases (MEDLINE, Embase, PsycINFO, SPORTDiscus, Environment Complete, Cochrane Database of Systematic Reviews, CINAHL, Transport Database and TRID) were searched along with grey literature from five jurisdictions (Canada, USA, U.K, Australia, International). References of review articles were hand searched for additional relevant material. The search resulted in 1229 peer-reviewed and 50 grey literature articles. Articles were included if they were a primary study, published between 1990 and 2013, which evaluated the impacts of mandatory bike helmet legislation for children, youth and adults, and used an appropriate comparison group. Titles and abstracts were first screened by two independent reviewers followed by a full-text review of selected articles. Forty-one peer-reviewed and 16 grey
literature articles were included in the review for a total of 57 articles. Two reviewers independently appraised 25% of the articles (n=15) to ensure consistent quality appraisal. After establishing agreement on quality rating, a single reviewer then extracted data and assessed the remaining 42 articles for methodological quality.

Results

Findings from the 57 articles included in this review suggest that mandatory bicycle helmet legislation was associated with increases in helmet use and helmet ownership, and decreases in hospitalizations, head injuries, severe injuries, injury severity and cycling related deaths, with mixed results regarding cycling participation and non-head injuries. Decreases among child and adolescent ridership were more commonly seen in jurisdictions with all-age rather than child-only helmet legislation, possibly mediated through reductions in adult role modeling; however role modelling was not measured.

Helmet legislation was also shown to be more cost-effective than community or school-based helmet programs and had minimal impact on knowledge and support for the law. More comprehensive legislation (i.e., all-age vs. child-only law) and supplementary educational or incentive programs were associated with greater law effectiveness.

However, as most studies do not report cycling exposure (e.g., number of people cycling, cycling trips, cycling distances travelled, or time spent cycling), it is not possible to fully characterize the impact of helmet legislation at the population level. Also, since most studies do not report cycling rates, it is not always possible to exclude decreased cycling (i.e., reduced number of people cycling) or increased cycling (i.e., increased modal share, whereby relatively fewer collisions and cycling-related injuries occurred as the number of cyclists on the road increased) as other possible explanatory mechanisms.

Limitations

As the review focused on outcomes of bike helmet legislation, by definition it did not include studies from jurisdictions without legislation (e.g., some European countries). However, pre/post and jurisdictional comparisons (e.g., comparing one province to another) were included in reviewed studies. This review did not examine the impact of helmet laws on the risk of head injuries per trip or per distance travelled as this information was not available in the current literature. Thus information on risk in relationship to exposure is incomplete.

This review also did not examine the potential health benefits/burdens due to increased or decreased activity-related chronic diseases (heart disease, stroke, dementia, diabetes, certain cancers) as might relate to the impact of helmet laws on cycling participation. A body of evidence suggests that the benefits of cycling far outweigh the risks (across various setting and scenarios), due to the large physical activity-related chronic disease impacts.
Finally, we acknowledge the possibility of publication bias. Despite these limitations, this review forms a useful basis for decision-making regarding bike helmet legislation, and mechanisms and contextual factors that need to be considered to optimize cycling outcomes overall.

Conclusion

The results demonstrated a positive effect of bike helmet legislation for outcomes including helmet use and ownership, and cycling-related head injuries and deaths. Our assessment shows that, in the studies reviewed, the effect of bike helmet legislation on injury and deaths was mediated mainly through increased helmet use (and the protective effect of helmets); however, findings from the majority of studies were not adjusted for cycling exposure, and therefore other mechanisms are possible. To achieve the health benefits of cycling, while avoiding unintended negative impacts (such as reduced cycling participation), the implementation of helmet laws should be considered alongside other contextual factors (such as safe cycling infrastructure and cycling education) that may influence law effectiveness, cycling participation and/or cycling safety.
References


