BRIEF REPORTS

Mandatory helmet legislation and children's exposure to cycling

A K Macpherson, P C Parkin, T M To

Abstract

***Background*—Mandatory helmet legislation for cyclists is the subject of much debate. Opponents of helmet legislation suggest that making riders wear helmets will reduce ridership, thus having a negative overall impact on health. Mandatory bicycle helmet legislation for children was introduced in Ontario, Canada in October 1995. The objective of our study was to examine trends in children's cycling rates before and after helmet legislation in one health district.**

***Setting*—Child cyclists were observed at 111 preselected sites (schools, parks, residential streets, and major intersections) in the late spring and summer of 1993–97 and in 1999, in a defined urban community.**

***Participants*—Trained observers counted the number of child cyclists. The number of children observed in each area was divided by the number of observation hours, resulting in the calculation of cyclists per hour.**

***Main outcome measure*—A general linear model, using Tukey's method, compared the mean number of cyclists per hour for each year, and for each type of site.**

***Results*—Although the number of child cyclists per hour was significantly different in different years, these differences could not be attributed to legislation. In 1996, the year after legislation came into effect, average cycling levels were higher (6.84 cyclists per hour) than in 1995, the year before legislation (4.33 cyclists per hour).**

***Conclusion*—Contrary to the findings in Australia, the introduction of helmet legislation did not have a significant negative impact on child cycling in this community.**

(*Injury Prevention* 2001;7:228–230)

Keywords: mandatory helmet legislation; bicycle helmets; exposure to cycling

Division of Pediatric Medicine and the Pediatric Outcomes Research Team, Department of Pediatrics, University of Toronto Faculty of Medicine and Population Health Sciences, Hospital for Sick Children Research Institute, Toronto, Canada
A K Macpherson
P C Parkin
T M To

Correspondence to:
Alison K Macpherson, Pediatric Outcomes Research Team, Hospital for Sick Children, 555 University Ave, Toronto, Ontario, Canada M5G 1X8
alison.macpherson@sickkids.on.ca

Children enjoy cycling as a recreational pastime and a form of transportation. However, cycling related injuries are an important cause of visits to emergency departments and hospitalizations for Canadian children. In Canada, over 2500 children are hospitalized each year for cycling related injuries, approximately 39% of these are injuries to the head.[1]

Despite the well documented effectiveness of bicycle helmets in reducing head injuries[2–8] helmet use rates remain relatively low in many parts of Canada. Strategies such as community education,[9] helmet subsidies, and legislation[10–12] have been implemented and evaluated in many countries throughout the world. Legislation has been shown to be effective in increasing helmet use rates. However, mandatory helmet legislation is the subject of much scientific and public attention. For example, when the British Medical Association's Board of Education and Science advocated against mandatory helmet legislation, responses to the publication[13] of this stance provoked an animated debate among readers of the *British Medical Journal*. The source of the debate is centered, at least in part, around the results of one study of the effects of helmet legislation in Victoria, Australia that reported a decrease in ridership among children aged 12 to 17 years in the two years after the introduction of helmet legislation.[14] According to those arguing against helmet legislation, reduced exposure to cycling has important public health consequences since reduced exercise may lead to poor cardiovascular health.[13] Many critics of helmet legislation argue that legislation should not be introduced if this results in reduced ridership. However, no other study about the relationship between legislation and exposure to cycling has been published.

Despite some opposition, mandatory bicycle helmet legislation for all children younger than 16 years was introduced in the province of Ontario, Canada in October 1995. Researchers at the Hospital for Sick Children have conducted observational studies of children bicycling in one health district in Ontario (East York) for the years pre-legislation from 1993–95, and the years post-legislation 1996, 1997, and 1999. The objective of this study was to examine trends in children's cycling rates and the location in which they cycled (school, park, residential street, major intersection, or bike path) in the years before and after the introduction of mandatory helmet legislation.

Table 1 Number of children observed and rate of cyclists per hour by year

	1993		1994		1995		1996		1997		1999	
	No of children	*Rate*	*No of children*	*Rate*	*No of children*	*Rate*	*No of children*	*Rate*	*No of children*	*Rate*	*No of children*	*Rate*
Schools	400	9.32	602	8.47	178	5.12	332	10.33	336	8.79	162	7.71
Parks	395	5.67	595	5.45	187	4.52	332	10.48	342	4.65	174	11.7
Residential streets	401	5.60	579	4.60	200	4.30	364	5.40	348	4.10	201	11.6
Major intersections	401	6.21	579	4.58	198	3.83	343	3.71	349	2.58	210	9.34
All sites	1597	6.58	2355	5.54	763	4.32	1371	6.84	1375	4.57	747	10.07

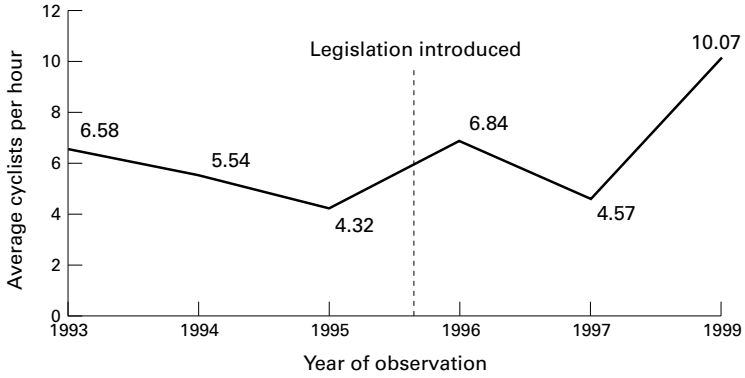

Figure 1 Changes in total cycling rate over time.

Methods

The project was conducted in the community of East York, in collaboration with the East York Health Unit. East York is a health district within Metropolitan Toronto in south central Ontario with a total population of approximately 100 000, and a school aged population of approximately 10 000. For census purposes, East York had been divided into 21 census tracts. The census tracts were grouped into seven areas which were geographically and socioeconomically distinct.

Child cyclists were observed at all 111 preselected sites in the late spring and summer of 1993–97 and in 1999. Observational sites included the schoolyards of elementary and middle schools (kindergarten to grade 8), parks, major intersections, and residential streets. Sites from all seven areas were included. Observers were trained to collect reliable observational data. We have previously shown that observers can be trained to make reliable observations.[9] The same standardized observation form was used in all years. Children were included in the observations if they were between the ages of 5 and 14 years and were riding a two wheeled bicycle. Observations of adults or young children, or of children riding any other type of vehicle were excluded. The observers remained at each site for one hour, counted the number of child cyclists, and noted whether or not the cyclist was helmeted.

For the purposes of the current study, the number of children observed cycling in each area was divided by the number of observation hours, resulting in the calculation of cyclists per hour. The rate of cyclists per hour was calculated for each of the types of observation area (schools, parks, residential streets, and major intersections), as well as an overall rate for each year. A general linear model, using Tukey's method, was used to compare the rate of cyclists per hour for each year. Tukey's method is used to test all pairwise comparisons among means, and to calculate confidence intervals for the differences between means.[15] Statistical significance was considered as a p value of less than 0.05. All analyses were carried out using SAS[16] software.

Results

The rate of child cyclists per hour varied over the six years in which it was recorded. Table 1 presents the number of children observed each year, and the rate of cyclists per hour for each type of site. Figure 1 depicts the rate of cyclists per hour for all sites combined. The lowest cycling rates were recorded immediately before the introduction of legislation in 1995 (4.32 cyclists per hour), and 1997 (4.57 cyclists per hour). In 1996, the year after legislation came into effect, cycling levels were significantly higher (6.84 cyclists per hour) than in 1995 (difference between means = 2.52; 95% confidence interval (CI) 0.09 to 4.95). The highest rate of cyclists was observed in 1999 (10.07 cyclists per hour), significantly different from all other years.

The cycling rate varied depending on the observation area, as shown in table 1. Schools and parks had the highest rate in most years, while residential streets and major intersections tended to have lower rates. The rate of children cycling to school did not change significantly throughout the study period, but in the year after legislation was introduced (1996), there was a significant increase in the number of children cycling in parks compared with 1995 (difference between means = 5.96; 95% CI 0.31 to 11.60). The rate of children seen cycling at major intersections declined slightly from 1995 to 1996 (difference between means = −0.13; 95% CI = −2.72 to 2.47).

Discussion

In this longitudinal observational survey, there was variability in the patterns of children cycling from year to year. The introduction of legislation did not appear to have an independent effect on children's cycling. We speculate that the variation in children's cycling may be related to the weather, changes in the community (for example, cultural composition, economic situation), or random variability of cycling at the observation sites.

A significant change in the location of child cyclists was observed the year after the introduction of legislation. In the year after the introduction of the law, children were more

Key points

- Opponents of mandatory bicycle helmet legislation claim that making riders wear helmets reduces ridership.
- Our observational study noted variation in cycling rates in different years, but variability not related to the adoption of legislation.
- Cycling rates did not go down after the introduction of mandatory helmet legislation.

likely to cycle in parks, and somewhat less likely to be observed at major intersections. It is possible that increased public awareness may have been stimulated by the accompanying public debate. This may have led parents to encourage their children to cycle in parks, a location likely to be perceived as safer than main streets. The change in location, however, did not appear to be sustained over time.

Ecologic studies such as this one, may be limited due to attributing causal relationships at the ecologic level to the individual (the ecologic fallacy). However, failure to find a significant association between the rate of cyclists per hour and the introduction of legislation, even at the ecologic level, leads us to conclude that a cause and effect relationship between mandatory helmet legislation and a reduction in children's bicycling is unlikely.

Legislation, as previously reported,[10] resulted in an increased rate of helmet use among children in East York. Contrary to the findings in Australia,[14] we did not find evidence in our community that the introduction of mandatory helmet legislation had a significant negative impact on children's exposure to cycling. These findings will be important when interpreting the influence of helmet legislation on childhood cycling related injury rates.

Implications for prevention

This study provides evidence that the introduction of mandatory helmet legislation does not lead to reduced exposure to cycling. Policymakers considering the adoption of mandatory helmet legislation in their jurisdiction may find this evidence useful.

This work was supported by the Ontario Ministry of Transportation, grant #9210, and the Ontario Ministry of Culture, Tourism and Recreation, grant #92–70–0408. The views of the authors do not necessarily reflect the views of these ministries. We gratefully acknowledge the contributions of the East York Health Unit. Ms Macpherson is a recipient of the PORT Doctoral Fellowship supported by the Hospital for Sick Children Foundation and an Emergency Health Services Fellowship from the Ontario Ministry of Health.

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on an adult-size ATV, (2) always wear a helmet and protective gear, (3) never ride tandem on a one-person ATV, (4) never ride on paved roads and (5) never ride under the influence of drugs or alcohol.

Although the CPSC believes that there would be a decline in deaths and injuries if riders followed these safe-riding practices, the agency has also proposed new rules to make riding safer. These include

- banning three-wheeled ATVs, which present three times the risk of injury compared with four-wheeled ATVs and have re-emerged through the import market, Internet and second-hand dealers;
- making the current voluntary standard mandatory, which would require all ATVs to meet US safety standards;
- calling for three models of youth ATVs instead of two and setting speed limitations for each youth model;
- requiring retailers to offer free training to all ATV purchasers and members of their immediate family;
- requiring retailers to provide a written form to purchasers warning against the use of adult ATVs by children and giving death and injury statistics related to children riding adult ATVs.

CALL FOR NEW US SHOPPING CART STANDARDS

The American Academy of Pediatrics (AAP) has called for a revision of the current US standard for shopping carts to include clear and effective performance criteria for shopping cart child-restraint systems and cart stability to prevent falls from carts and cart tip-overs. An AAP policy statement was published in the August 2006 issue of Pediatrics. (The abstract of the policy statement can be accessed at http://tinyurl.com/y6lglv.) Injuries associated with shopping carts are an important cause of pediatric morbidity, especially among children of age<5 years. The policy statement presents background information and recommendations from AAP's Committee on Injury, Violence, and Poison Prevention about prevention of shopping-cart-related injuries.

SAFE COMMUNITIES 20 YEARS ON

The September issue of the bulletin of the Queensland Injury Surveillance Unit contains a thought-provoking article on the success or otherwise of WHO Safe Communities, a concept that is now over 20 years old (http://tinyurl.com/yk7ltz). The authors, Ruth Barker and Dawn Spinks, note that the concept of ''Safe Communities'' evolved after a successful community-based injury prevention project in Falköping, Sweden in 1974. The premise of this concept draws from community development models and maintains that communities are best placed to develop and implement local solutions for local injury risks. Although environment and behavior have long been accepted as predeterminants for disease, the challenge has been to expand this understanding to include injury. Currently, there are 101 designated WHO safe communities representing populations from 1000 to 1 000 000. Most of them are Scandinavian communities, but the model is increasingly being taken up in Canada, China, South East Asia, Australia and New Zealand. However, despite nearly two decades of experience with this strategy, strong evidence of its success in reducing injuries in the community is lacking. A Cochrane review: ''The WHO Safe Communities model for the prevention of injury in whole populations'', conducted in 2005, showed that only seven WHO Safe Communities, of the then more than 80 worldwide, had ''undertaken controlled evaluations using objective sources of injury data''. The authors concluded that ''evidence suggests the WHO Safe Communities model is effective in reducing injuries in whole populations. However, important methodological limitations exist in all studies from which evidence can be obtained. A lack of reported detail makes it unclear which factors facilitate or hinder a programme's success.''

LEGO RECALLS TOY TRUCKS

The US Consumer Product Safety Commission, in cooperation with toy manufacturer Lego Systems, announced in September a voluntary recall of over 350 000 Lego Explore Super Trucks. The plastic wheels on the truck can detach, exposing a metal axle. This poses a puncture hazard to young children. Lego Systems Inc has received 10 reports of a wheel detaching, with two children receiving serious puncture injuries resulting from the exposed metal axle and another child falling when the wheel came off of the toy truck.

INJURY PREVENTION NEWS—NEW NEW ZEALAND INJURY BULLETIN

A new comprehensive two-monthly e-newsletter, IP News, a collaboration between the New Zealand Injury Prevention Strategy Secretariat, Injury Prevention Network Aotearoa New Zealand, the Safe Communities Foundation New Zealand and Sandra James, allows readers to keep themselves up to date on injury prevention activities in New Zealand. Visit http://tinyurl.com/wn6y2 to read the second issue and to subscribe to receive it regularly by email.

FENCES AND SAFETY MEASURES REDUCE CHILD POOL DEATHS

For the first time in decades, the Phoenix, Arizona, area went an entire summer without a single child drowning in a swimming pool—a remarkable feat in this often broiling desert city full of backyard places in which to take a dip.

Contributors to these News and Notes include Anara Guard, Ian Scott, Joe Colella, Sue Campbell and Barry Pless. Michael Hayes has edited the contributions. Items for future issues, including calendar entries, should be sent to Michael Hayes at mike.hayes@capt.org.uk as soon as possible.

CORRECTION

There was an error in table 1 of the article by Macpherson A, Parkin P, To T. Mandatory helmet legislation and children's exposure to cycling. *Injury Prevention* 2001;**7**:228–30. The correct table is available online at http://ip.bmjjournals.com/supplemental/. The authors would like to state that although the number of children was incorrectly transcribed, the conclusions remain unchanged.