

Increasing bicycle helmet use in the community

Measuring response to a wide-scale, 2-year effort

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OBJECTIVE To determine whether a wide-scale, long-term community promotional effort would increase the use of bicycle helmets among children.

DESIGN Over 2 years, a non-profit group coordinated a range of activities to promote helmet use. On one date before the intervention began and three dates during the intervention, observers surveyed students riding bicycles.

SETTING Cyclists were observed at 5 elementary schools, three secondary schools, and two community college entrances.

PARTICIPANTS A total of 851 cyclists were observed, 536 of them at elementary schools in a convenience sample.

INTERVENTIONS Print, radio, and television advertising; posters; pamphlets; bicycle rodeos; and a play were used in a public awareness campaign. Health promotion activities included education, social marketing, community development, and legislative action.

MAIN OUTCOME MEASURES Number of cyclists and whether they wore helmets.

RESULTS Combining the two observation dates for each year, helmet use increased from 5.4% in 1990 to 15.4% in 1991. The greatest increase was observed among elementary school students, the group most at risk of serious head injury or death. Overall, girls were twice as likely to wear helmets as boys.

CONCLUSIONS Wide-scale, long-term community promotion appears to be effective in increasing the use of bicycle helmets.

OBJECTIF Déterminer l'efficacité d'une campagne communautaire de promotion, effectuée à grande échelle et à long terme, visant à augmenter le port du casque de cyclisme chez les enfants.

CONCEPTION Pendant deux ans, un groupe à but non lucratif a coordonné diverses activités visant à promouvoir le port du casque de cyclisme. L'observation des cyclistes étudiants eut lieu à une date prédéterminée avant le début de l'intervention et à trois dates différentes pendant le déroulement de l'intervention.

CONTEXTE L'observation des cyclistes s'est déroulée à l'entrée de 5 écoles élémentaires, de trois écoles secondaires et de deux collèges communautaires.

PARTICIPANTS 851 cyclistes furent observés dont 536 à l'entrée des écoles élémentaires.

INTERVENTIONS Campagne de sensibilisation auprès de la population utilisant la publicité dans la presse écrite, la radio et la télévision. Les activités de promotion de la santé comprenaient: éducation, activités sociales, développement communautaire et action législative.

PRINCIPALES MESURES DES RÉSULTATS Nombre de cyclistes et décompte du nombre de porteurs de casque protecteur.

RÉSULTATS Lorsqu'on combine les deux dates d'observation pour chacune des années, on constate que le port du casque de cyclisme est passé de 5,4% en 1990 à 15,4% en 1991. L'augmentation la plus importante a été observée chez les étudiants de l'école élémentaire qui constituent le groupe le plus à risque de traumatismes crâniens graves ou de décès. Globalement, les filles étaient deux fois plus susceptibles de porter leur casque comparativement aux garçons.

CONCLUSIONS La promotion communautaire à grande échelle et à long terme semble efficace pour accroître l'usage du port de casque de cyclisme.

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EVERY YEAR, ABOUT 60 CANADIAN children die from injuries sustained while riding bicycles.¹ Most of these deaths result from head injuries. Several studies have found that bicycle-related falls are a common cause of outdoor injuries among children.^{2,3}

Bicycle helmets have been shown to reduce the risk of head injury to cyclists involved in accidents by 85%, and the risk of brain injury by 88%.⁴ However, numerous studies across North America have shown very low rates of helmet use, ranging from 1.0% in Portland⁵ and 1.9% in Ottawa² to 4% in Tucson.⁶ Reasons for these low rates are thought to include cost, peer pressure, lack of awareness of potential benefit in the event of a crash, and the absence of laws making helmet use mandatory.

Two of the authors⁷ conducted a project in 1989 to assess various strategies for increasing bicycle helmet use among schoolchildren in Barrie, Ont, a city of 60 000 people. Following the success of that project, a group met to design and implement a program to increase the use of bicycle helmets throughout the community. This group became known as CHIP, the Coalition for Head Injury Prevention.

In this article, we describe CHIP's activities and report on the actual rate of bicycle helmet use among Barrie schoolchildren during the first 2 years of CHIP's work.

METHODS

Intervention program

Members of CHIP included representatives of the public health unit, school boards, the city police department, service clubs, retailers, the local Head Injury Association, cycling enthusiasts, the media, and family physicians. Members, most of them unpaid, participated out of a personal commitment to cycling safety. During the first year of the program, funding came from community agency, retail,

and service club sponsorship. In March 1991, CHIP received a \$10 000 seed grant from the Health Promotion Branch of the Ontario Ministry of Health.

Our program was designed to address barriers to helmet use, concentrating on children as our primary target. Several health promotion strategies were employed, including education, social marketing, community development, and legislative action. Activities to increase public awareness of bicycle helmets included television advertisements, outdoor posters, and local media coverage. A bicycle rodeo was held each spring. The CHIP group produced pamphlets, which were circulated to schools and at numerous community events. Police officers who teach a bicycle safety module at elementary schools emphasized the importance of helmets.

All of these activities portrayed helmets as desirable, using peer models wherever possible. One particularly effective example was a secondary school drama troupe production, presented to elementary school audiences. With a sensitivity to the feelings and experiences of young people, troupe members used their creative talents to send a clear message that helmet use is both wise and "cool."

To make helmets available at a reduced cost, local retailers were persuaded to participate in bulk purchases and to provide discount coupons, which were widely distributed. The bicycle helmet coupon program organized by the Canadian Medical Association and Sandoz Pharmaceuticals was available during the second year of our program, and was extensively promoted by CHIP.

In conjunction with many other groups across Ontario, we lobbied the provincial government in favour of Bill 166, a private member's bill that proposed amending the Ontario Highway Traffic Act to make helmets mandatory for all cyclists. We also encouraged Barrie City Council to erect signs promoting helmet use on roads and bicycle paths (*Table 1*).

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Data collection

We chose 10 observation sites around the city: five of the city's 20 elementary schools, three of the four secondary schools, and two different entrances to the local community college. Detailed

maps of observer location were used to ensure consistency.

Observations in each case were made from 0800 to 0900 on school days, when no rain was expected. The days chosen were in May 1990 (before

Table 1. Bicycle helmet promotion activities

ACTIVITY	1990	1991
PUBLICITY		
• Radio: news feature, public service announcements	Yes	Yes
• Print: news and lifestyle, features, columns	Yes	Yes
• Television: news features, local (CKVR) news	Yes	Yes
ADVERTISING (PAID AND PUBLIC SERVICE ANNOUNCEMENTS)		
• Bus stop benches (4 locations for 6 months)	No	Yes
• 30-second television commercial (63 spots over 3 weeks)	No	Yes
PUBLICATIONS		
• <i>Health Matters</i> newsletter (2500 or more circulation)	Yes	No
• School newsletters	Yes	Yes
• Pamphlet (<i>Keep A "Head" of the Crowd</i>)	Yes	Yes
COMMUNITY EVENTS		
• Diabetes Bikathon	Yes	No
• Police Week	Yes	Yes
• Supercycle demonstration	Yes	No
• Bicycle technician demonstration	Yes	No
• Family Cycle Sunday	Yes	No
• Bicycle rodeo	Yes	Yes
• Kempenfelt Classic Cycling Race	No	Yes
EDUCATION		
• Elementary schools (with school safety police officers)	Yes	Yes
• Drama troupe production	No	Yes
• Parent and community groups	Yes	Yes
• Point-of-purchase awareness (with retailers)	Yes	Yes
• Hospital rounds	Yes	Yes
• School principals	Yes	Yes
LOW-COST HELMET ACCESS		
• Discount coupons	Yes	Yes
• Bulk purchases	Yes	Yes
• Canadian Medical Association and Sandoz offer	No	Yes
• Prizes	Yes	Yes
LEGISLATIVE ACTION		
• Lobby for bike path signs	No	Yes
• Lobby in support of Bill 166	Yes	Yes

any program activities began), then October 1990, May 1991, and October 1991. The observers were secondary school science students. When class timetables permitted, the same students were used at the same sites on subsequent observation dates.

Data collected described the number of cyclists, their sex, and whether they were wearing helmets. Data were entered using Epi-info software,⁸ which was also used for data analysis. Specific tests included odds ratios and χ^2 tests.

RESULTS

A total of 851 cyclists were observed during the study. The rate of helmet use by elementary school students was 11.4% (61/536), by secondary school students 4.9% (12/247), and by college students 16.2% (11/68) ($P < 0.005$). Overall, girls were twice as likely as boys to wear helmets: the rate among girls was 15.7% (31/197) compared with 8.1% for boys (53/654) (odds ratio = 2.12, 95% confidence interval 1.27 to 3.51).

The rate of helmet use increased during the study period (Table 2). If the two observation dates for each year are combined, then helmet use increased from 5.4% in 1990 to 15.4% in 1991 ($P < 0.001$).

When the four observation dates were analyzed separately, helmet use by boys did not increase significantly, while use by girls did. However, if the data are grouped by year, then helmet use by both sexes shows a significant increase. Use by boys rose from 5.6% in 1990 (20/354) to 11% in 1991 (33/300) ($P = 0.012$). Use by girls rose from 4.4% in 1990 (5/113) to 30.9% in 1991 (26/84) ($P < 0.00001$).

The changes in helmet use over time can be further analyzed based on level of school at which the observations occurred (elementary, secondary, and college). Helmet use did not change significantly among secondary or college students; numbers were too small to allow analysis by sex at those

levels. However, there were large changes at the elementary level. The overall rate of use observed at elementary schools on the first date was 3.4% (5/147); on the second date was 2.5% (4/157); on the third date rose to 25.2% (35/139), and was 18.3% (17/93) on the final date ($P < 0.00001$). This change holds true when analyzed separately for elementary boys, whose rate of use rose from 2% on the first

Table 2. Helmet use in Barrie during the study period

DATE	NO. OF CYCLISTS OBSERVED	NO. WEARING HELMETS (%)
BOYS ($P = 0.057$)		
May 1990	190	8 (4.2)
October 1990	164	12 (7.3)
May 1991	172	18 (10.5)
October 1991	128	15 (11.7)
TOTAL	654	53 (8.1)
GIRLS ($P < 0.0001$)		
May 1990	70	4 (5.7)
October 1990	43	1 (2.3)
May 1991	63	22 (34.9)
October 1991	21	4 (19.0)
TOTAL	197	31 (15.7)
ALL CYCLISTS ($P < 0.001$)		
May 1990	260	12 (4.6)
October 1990	207	13 (6.3)
May 1991	235	40 (17.0)
October 1991	149	19 (12.8)
TOTAL	851	84 (9.9)

observation to 17.3% on the last ($P < 0.00001$) and for elementary girls, whose rate rose from 7% on the first date to 22% on the last ($P < 0.00001$).

DISCUSSION

The baseline rate of bicycle helmet use observed (4.6%) was low, and in accordance with two previous surveys in Barrie that found helmet use among schoolchildren to be 0% in 1988⁷ and 3.6% in 1989.⁹

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The trend in bicycle helmet use from 1985 to 1990 was studied by Weiss¹⁰ in Tucson, a city that had no community intervention. Apart from an increase in helmet use at one elementary school (which had its own program), the city showed no change in rate of helmet use over the 5 years. This finding suggests that "in the absence of such (planned) programs, helmet use among children... will not increase simply because of nonspecific 'awareness.'"¹⁰

There is good evidence that limited or short-term interventions have little or no effect. A randomized trial in ambulatory care settings used physician counseling and take-home pamphlets as the intervention.¹¹ Two to 3 weeks later, 7.2% of the intervention group had bought helmets, as had 7% of the control group, showing virtually no difference. A similar study involved children who had come to emergency departments after bicycle injuries.¹² In this study, 8.0% of the control group purchased helmets, compared with 9.3% of the group that received education and pamphlets. A third study, a school-based program including lectures, skits, posters, and take-home brochures, found no effect at all on observed helmet use.⁷ None of the results in these three studies approached either clinical or statistical significance.

In contrast, large-scale community programs have been much more effective. In Seattle, helmet use increased from 5.5% to 15.7% over an 18-month period.⁵ The Seattle program was coordinated by a full-time health educator and involved public service announcements, bicycle shop promotion, pamphlets, stickers, rodeos, discount coupons, and numerous speaking engagements. In Ottawa, helmet use has increased from 10.7% in 1988 to 32.5% in 1991 ($P < .0001$), again following a committed, wide-scale program.¹³

Do we know with certainty that the community program described was directly responsible for the increased helmet use that we observed? No, and

in the absence of a control group – an observed city that had no such program – we cannot know. We can, however, note that helmet use in Barrie had risen fairly slowly for the 3 years before the program (from zero to 3.6% and 4.6%) and then increased 18 months later, after the program, to 12.8%. Was this merely a coincidence? Moreover, in a study⁵ that did use a control city, helmet use increased from 5.5% to 15.7% in the intervention city and from 1.0% to only 2.9% in the control city.

The observations in our study were performed at a variety of sites around the city. The schools chosen were a convenience sample, as the city has previously been shown to be quite homogeneous with respect to average income (P. Parkin, written communication). We assumed that cyclists riding in the immediate vicinity of schools during the hour before school began would be students at that school. To increase the power of that assumption, we did not station observers at the one secondary school that has an elementary school directly across the street.

We chose secondary school students as our observers because of their availability and interest, and because previous studies had shown that secondary students were less likely to wear helmets than other students.^{6,13} We hoped that involvement in this work would sensitize them to the issue of bicycle helmet use. We also included coupons for reduced prices on helmets with their payment.

Our study confirmed the U-shaped curve of helmet use in the different age groups, with use being lowest in secondary students. Are elementary students more likely to comply with parental instructions? Are college students more mature and less concerned with peer pressure? Secondary school students are risk-takers in many other ways; is shunning helmets just another risk to take?

In our community, the increase in helmet use among elementary students was both large and gratifying. Because

children (especially boys) of this age are the most likely to be seriously injured or killed by bicycle-related head injuries, we believed it was crucial that our intervention have a significant effect on this group.

The health promotion program has had an important effect on our community. The program required little direct funding and the leadership efforts of fewer than a dozen people; other communities could well replicate these efforts. However, such programs will be unnecessary – or, at least, much easier – once legislation requiring helmet use is enacted. A recent report has described the experience in Howard County, Maryland, the first jurisdiction in the United States to mandate bicycle helmet use.¹⁴ Observations made 2 months before the effective date of the legislation showed 4% of county children wearing helmets; 7 months after the law took effect, the comparable rate was 47% (the highest documented for American children). Similar legislation has recently (June 1993) been enacted in Ontario, and will take effect in October 1995. The delay is to allow more time for education and promotion. We hope that the legislation will succeed as the Maryland law did, and that other jurisdictions in Canada will follow suit.

Because of the efforts of our group and similar local groups across the country, as well as national organizations (such as the Canadian Medical Association), bicycle helmet use is no longer a curiosity. We hope to see it become the norm. ■

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