

# BICYCLE HELMET USE

In Utah



10-Year Observational Survey  
**1994-2003**

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### 10-Year Observational Survey

# 1994-2003

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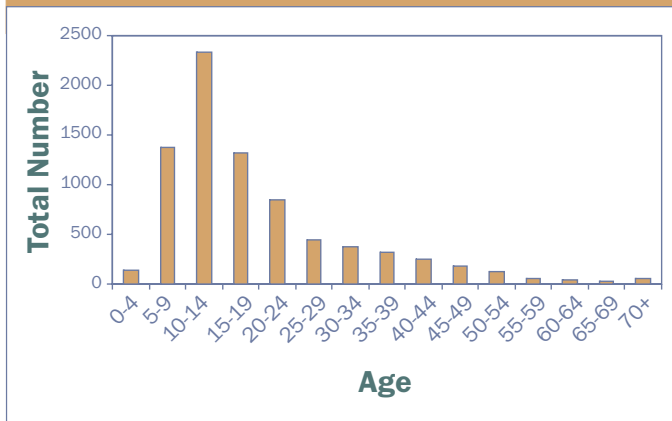
Correct and incorrect way to wear a bicycle helmet



## Introduction

Each year an average of 940 Utah bicyclists are injured in crashes with motor vehicles and seven are killed. Two-thirds of these injured bicyclists are younger than 19 years of age and more than three-fourths are males.<sup>1</sup> (See Figure 1.)

**FIGURE 1**  
**Utah Motor Vehicle/Bicycle Crashes By Age of Bicyclist, 1992-2001**



**Table 1**  
**Top Ten States for Motor Vehicle/Bicycle Fatality Rate per Million Population, 1993-2002<sup>2</sup>**

Rank	State	Rate
1	Florida	7.82
2	Arizona	5.52
3	Louisiana	5.48
4	South Carolina	4.58
5	Alaska	4.20
6	North Carolina	3.98
7	Nevada	3.69
8	Delaware	3.56
9	California	3.55
10	Utah	3.46

As shown in **Table 1**, Utah had the tenth-highest bicycle fatality rate in the U.S. from 1993 to 2002.<sup>2</sup> Nationally, children age 15 years and younger account for 40% of all bicyclists, but sustain a disproportionate 71% of all bicycle-related injuries.<sup>3</sup> Head injuries are a frequent outcome of bicycle crashes, accounting for about one-third of emergency

department visits, two-thirds of hospital admissions, and three-fourths of deaths.<sup>4-6</sup> Wearing a helmet is one of the most important factors in lowering the risk of serious injury or death from a bicycle crash.<sup>7</sup>

## Methods

This survey was developed to obtain statewide baseline data on helmet use by elementary school-age children. It was modeled after an evaluation program conducted by the New York Department of Health.<sup>8</sup> Modifications were made after conducting a pilot study in Utah.

### School Selection

A stratified random sample based on school population size was selected from among all Utah elementary schools for this survey. The total number of schools observed was 20. One school closed after the 1994 observation, which reduced the total number of schools observed to 19 for 1994-2001. In 2002, new schools were randomly selected using the same criteria.

### Observation Protocol

Bicycle helmet observations had two identified components: (1) observations at the selected elementary schools, and (2) observations in neighborhoods surrounding the schools.

For the school observations, the observer arrived at the school 20 minutes before school was dismissed and stayed until 20 minutes after school was dismissed. The observer selected an observation site with a direct view of the bicycle rack(s), preferably off school grounds. No contact was made with school staff prior to or during the observation.

Neighborhood observations consisted of canvassing the surrounding neighborhoods within a two-mile radius of the selected schools. These observations were made while driving slowly for 15 minutes in each of the four directions



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from the school. In addition, the observer parked for 20 minutes at a park or convenience store located within the two-mile radius of the school and recorded all bicyclists seen.

School and neighborhood observations were completed on the same day and the total observation time lasted two hours. Helmet use was determined by unobtrusive observation. No interaction with the bicyclists occurred.

## Data Collection Instrument

The observations were recorded using a Bicycle Helmet Observation Form. The observer recorded:

- Estimated age of the bicyclists:
  - > preschool (0-4 years)
  - > elementary school (5-11 years)
  - > secondary school (12-18 years)
  - > adult (19+ years)
- Gender
- Helmet use
- Correct or incorrect use of the helmet (position, strap, or unidentified)

## Results

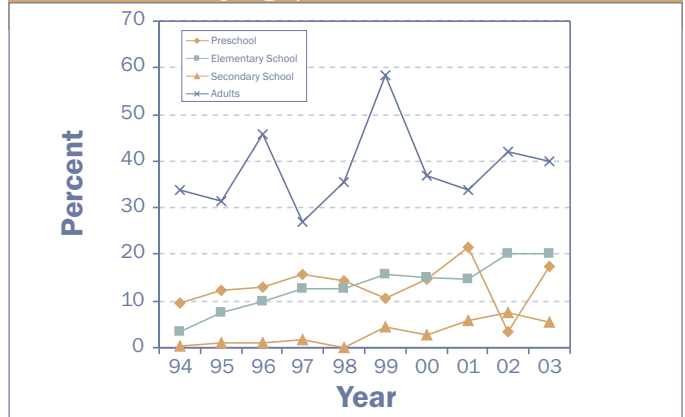
### Helmet Use Among All Age Groups

Bicycle helmet use in Utah is slowly increasing. Over the period of the study, a total of 12,610 bicyclists were observed. Helmet use increased among all age groups in the observations from 4.6% (n=1,710) in 1994 to 19.9% (n=1,665) in 2003. (See Figure 2.)

### Helmet Use Among Preschool-age Bicyclists

The smallest number of bicyclists observed were preschool-age and were observed riding at or near a home or in bicycle carriers and trailers. Preschool helmet use fluctuated around the ten-year average of 12.7% (n=410).

**FIGURE 2**  
**Percentage of Bicycle Helmet Use By Age, in Utah 1994-2003**



	Year									
AGE GROUP	94	95	96	97	98	99	00	01	02	03
Preschool (n=410)	9.5	12.2	13.0	15.8	14.3	10.5	14.8	21.4	3.4	17.5
Elementary School (n=9,663)	3.4	7.6	10.0	12.7	12.5	15.6	15.1	14.6	20.1	20.2
Secondary School (n=1,639)	0.2	0.9	1.0	1.7	0.0	4.6	2.7	5.7	7.5	5.4
Adults (n=898)	33.9	31.3	45.8	26.9	35.4	58.3	36.8	33.9	42.1	39.9
All Ages (N=12,610)	4.6	8.6	11.6	12.4	12.4	16.4	16.1	15.6	19.6	19.9

*Note: Until a child is over age one and able to hold up his or her head independently, he or she should not ride in a bicycle carrier or trailer.*

### Helmet Use Among Secondary School-age Bicyclists

Helmet use among secondary school-age bicyclists was minimal, with 2.7% (n=1,639) of observed bicyclists wearing helmets over the course of the study. However, this age group did show increases over the last three years of the study, with a high of 7.5% helmet use in 2002. More than 80% of the bicyclists observed in this age group were males.

### Helmet Use Among Adult Bicyclists

Helmet use among adults was higher than that of any other age group, averaging 37.8% (n=898) over the study. Many of the helmeted adult bicyclists wore full riding gear (helmet, bicycle shorts, bicycle jersey) and were not riding with children.



Most adult bicyclists were males (82%). Males had a higher helmet use rate than females (41% to 24%).

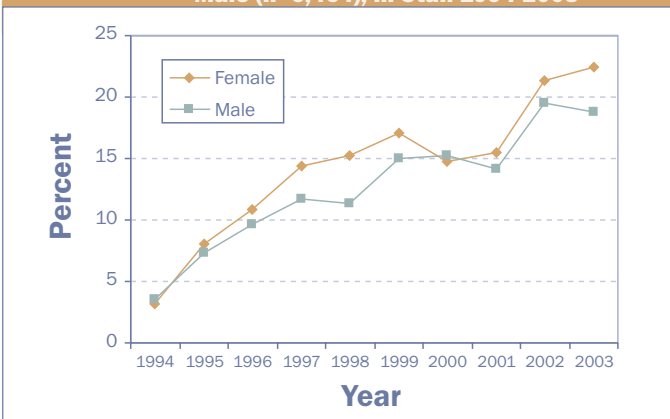
## Helmet Use Among Elementary School-age Bicyclists

The primary objective of the survey was to provide accurate data regarding children's bicycle helmet use in Utah. Results of the study indicated bicycle helmet use among elementary school-age children increased at school and in neighborhoods. Over the study, 9,663 elementary school-age bicyclists were observed, with 6,114 (63%) in the school observations and 3,549 (37%) in the neighborhood observations. (See Figure 2.)

## Gender

Males accounted for the majority (67%) of the elementary-age bicyclists observed. While twice as many males rode bicycles, a smaller percentage of them wore helmets. (See Figure 3.)

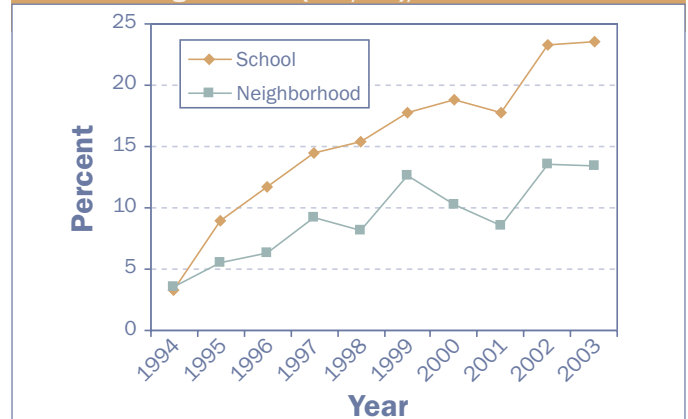
**FIGURE 3** Percentage of Helmet Use Among Elementary School-Age Bicyclists, by Female (n=3,199) and Male (n=6,464), in Utah 1994-2003



## School vs. Neighborhood

Helmet use at schools was higher than helmet use in neighborhoods. (See Figure 4.) However, use increased at schools and in neighborhoods throughout the study.

**FIGURE 4** Percentage of Helmet Use Among Elementary School-Age Bicyclists, by School (n=6,114) and Neighborhood (n=3,549), in Utah 1994-2003

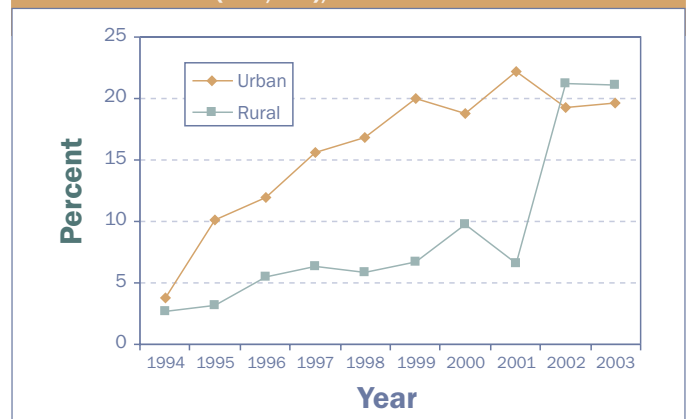


## Rural vs. Urban

Elementary schools were identified to be located in rural (0-100 persons per square mile) or urban counties (>100 persons per square mile).

Helmet use in urban areas was nearly three times greater than in rural areas until 2002. (See Figure 5.)

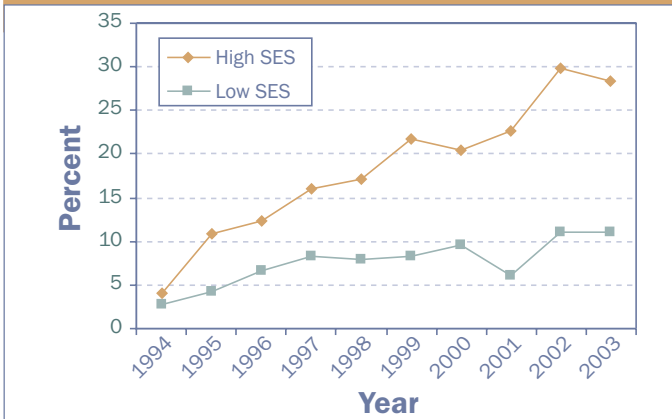
**FIGURE 5** Percentage of Helmet Use Among Elementary School-Age Bicyclists, by Urban (n=6,090) and Rural (n=3,573), in Utah 1994-2003



## Socioeconomic Status (SES)

SES was determined by the percent of students enrolled in free or reduced-cost lunch programs. Schools were divided by high SES (0-25% of students enrolled in lunch programs) and low SES (>25% of students enrolled in lunch programs). SES proved to be a greater determinant of helmet use than rural/urban classification. Helmet use in high SES areas was far superior to helmet use in low SES areas as shown in **Figure 6**. Helmet use increased in both high and low SES areas; however, use increased dramatically in high SES areas. Elementary school-age bicyclists in high SES areas were three times more likely to wear a helmet at school and twice as likely to wear a helmet in the neighborhood as their counterparts in low SES areas.

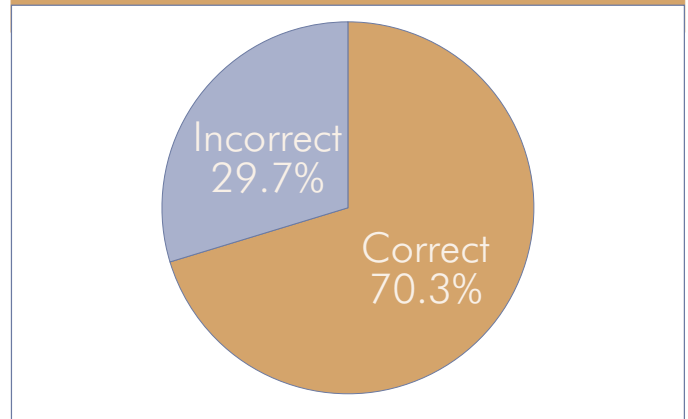
**FIGURE 6** Percentage of Helmet Use Among Elementary School-Age Bicyclists, by High SES (n=5,036) And Low SES (n=4,627), in Utah 1994-2003



## Proper Helmet Use

During the study the observer documented whether bicyclists wore their helmets properly. The observer looked to see if the helmet was positioned correctly, and whether the strap was adjusted and fastened correctly. As shown in **Figure 7**, nearly one-third of bicyclists were seen wearing helmets incorrectly. Of those, two-thirds wore the helmet tilted back, exposing the forehead. The remaining one-third fastened the chin strap either too loosely or not at all.

**FIGURE 7** Percentage of Properly Worn Bicycle Helmets Among Elementary School-age Bicyclists (n=1,165), in Utah 1994-2003



## Discussion

More children in Utah are using bicycle helmets every year; however, their use rate is still below national averages.<sup>9,10</sup> This suggests that helmet promotion is urgently needed. Educational and promotional campaigns for bicycle helmet use are usually most effective when conducted at the local or community level. These community campaigns must include several strategies, as single interventions do not have the same impact as multiple interventions.<sup>11</sup> This study identified several target audiences where bicycle helmet use should be improved.

### Recommended Target Audiences

#### Elementary School-age Children

Children in Utah wear helmets less often and sustain more bicycle-related injuries than adults. Nationally, many of these injuries are associated with the bicyclist's behavior (e.g., riding into streets without stopping, swerving into traffic, running stop signs, and riding against the flow of traffic).<sup>13</sup> Elementary school-age children should be a primary target of intervention programs as the majority of children ride bicycles, injury rates are high, helmet use





is low, and persons who begin using helmets as children are more likely to continue to use them as adults.<sup>11</sup> Since most people learn to ride a bicycle between the ages of five and eight years, that should also be the time to learn safe bicycling habits.

## Male Bicyclists

Male bicyclists should be targeted, as they ride bicycles more than females and thus sustain more injuries. Male elementary school age-bicyclists wear helmets less than females, in contrast to the adolescent and adult populations where males had higher usage rates. Males, especially male children, need to be educated on the importance of wearing helmets.

## Rural Bicyclists

For most years of the study, urban bicyclists wore helmets considerably more than rural bicyclists. Other studies also have found that urban helmet use was considerably higher than rural use.<sup>18</sup> Some reasons for lower use could be that bicyclists are less likely to wear helmets on streets with low traffic volume,<sup>9</sup> and that some parents believe there is less need for helmets in rural areas.<sup>19</sup> This study also shows the potential for improvement in rural areas. Helmet use in rural areas increased substantially the last two years of the study primarily because of high helmet use at two rural schools.

## Bicyclists in Neighborhoods

Increasing helmet use in neighborhoods should be a priority. More bicyclists wear helmets at school than in neighborhoods. Other studies have shown that bicyclists are less likely to wear helmets when not riding in traffic and on short trips,<sup>9,19</sup> which could explain the decreased use in neighborhoods. Focus groups conducted with elementary-school age bicyclists found that helmet use was considered acceptable for certain kinds of bicycle riding (i.e., riding to or from school), but less appropriate for routine riding (i.e., riding in a neighborhood).<sup>14</sup> Bicyclists are always at risk for falling and thus for head injury, regardless of where they ride.<sup>11</sup> In fact, children are more likely to be injured on

## The goals of bicycle safety programs should be to:

- Increase the wearing of bicycle helmets
- Increase the correct use of helmets
- Promote safe bicycling behaviors
- Create safer bicycling environments<sup>12</sup>

## Parents

Parents play a key role in children's ownership and use of bicycle helmets,<sup>14</sup> and should be the first line of defense for preventing injuries. Parents must be educated about the need for helmets and encouraged to require helmet use by their children. One study found that more than half of children said they would wear helmets if parents required it.<sup>15</sup> Parents can also increase helmet use by their children through their example, as children are more likely to wear helmets if their parents do as well.<sup>16</sup>

## Secondary School-age Bicyclists

Secondary school-age bicyclists demonstrate the lowest rates of helmet use and are involved in nearly one-half of motor vehicle/bicycle crashes in Utah.<sup>1</sup> Lack of peer support and helmet design are two reasons teenagers do not wear helmets. Interventions targeting this age group should maximize consumer acceptance of helmets for reasons other than safety alone. Interventions should also include information on how teens can serve as role models for their friends and siblings by always wearing a helmet in all riding locations.<sup>17</sup>





residential streets close to home. The typical motor vehicle/bicycle crash occurs within one mile of the bicyclist's home.<sup>20</sup>

## Bicyclists in Lower SES Areas

Bicyclists in low SES areas should also be a target audience. Children who do not have helmets cannot use them, so helmet distribution should be a focus of intervention programs, particularly in low SES areas. Low-cost helmets are widely available. Bicycle helmet giveaway programs alone are not sufficient to sustain high usage rates among youth and may not benefit teens at all. Giveaways should be coordinated with other activities that occur at several intervals throughout the course of a program.<sup>21</sup> Educational interventions that address beliefs about helmet effectiveness have been found to be a better way to maximize the impact on children's bicycle helmet use than giveaways.<sup>22</sup>

## Other Priorities

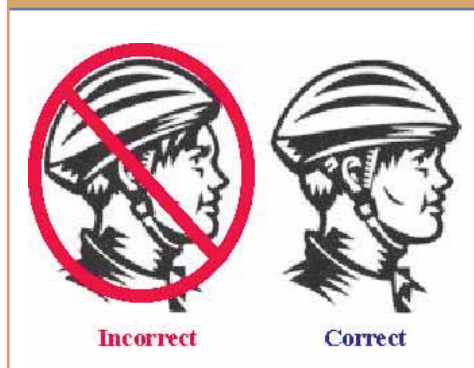
### Correct Use of Helmets

Children and parents need to be taught the correct way to wear a bicycle helmet. Helmets must be fitted and securely fastened to the bicyclist's head to provide maximum protection,<sup>11</sup> as poor helmet fit substantially lessens the protective effect.<sup>23</sup> This study finds that nearly 30% of children did not wear their helmet correctly. These findings may under-represent true fit errors as this was a study of observed errors and not tested errors. Poor helmet fit exposes the frontal region of the head, the most common site of impact in bicycle head injuries.<sup>24</sup> Injuries to this part of the brain can cause problems with motor function, problem-solving, spontaneity, memory, language, initiation, judgment, impulse control, and social behavior. As shown in **Figure 9**, a helmet should sit low on the forehead and parallel to the ground when the head is held upright; the inside pads should be installed or removed as necessary to make the

helmet snug; the straps should form a "V" around the ears; and the chin strap should be adjusted so it is comfortably snug. Teaching children and parents correct helmet and strap position must be included in a promotion strategy.

FIGURE

## 8 The correct and incorrect way to wear a bicycle helmet.



## Bicycle Helmet Legislation

The state of Utah has no legislation requiring bicyclists to wear helmets. Helmet laws in other states have been shown to substantially increase the likelihood of their use.<sup>12</sup> Passing a Utah helmet law would increase the usage rate among all riders age 16 and under an additional 18%.<sup>25</sup>

## Conclusion

Bicycle helmet use has increased over the last ten years in Utah; however, combining community-based educational programs, followed by enactment of legislation or regulations, will best achieve the goal of increasing bicycle helmet use.

## References

- [1] Utah Crash Outcome Data Evaluation System. *Utah Crash Summary*. Salt Lake City, UT: Intermountain Injury Control Research Center, 1993-2002.
- [2] National Highway Traffic Safety Administration. *Traffic safety facts 1993-2002*. Washington, DC: U.S. Department of Transportation, 2003.
- [3] United States Consumer Product Safety Commission. *Bicycle helmet facts*. Washington, DC, 1994.
- [4] Sacks JJ, Holmgren P, Smith SM, et al. Bicycle-associated head injuries and deaths in the United States from 1984 through 1988: how many are preventable? *JAMA* 1991; 266:3016-8.
- [5] Thompson RS, Rivara FP, Thompson DC. A case control study of the effectiveness of bicycle safety helmets. *N Eng J Med* 1989;320:1361-7.
- [6] Wilson MH, Baker SP, Teret SP, et al. *Saving children: a guide to injury prevention*. New York: Oxford University Press, 1991.
- [7] Grossman DC. The history of injury control and the epidemiology of child and adolescent injuries. *The Future of Children: Unintentional Injuries in Childhood*. 2000;10(1):23-52.
- [8] NY State Department of Health, Injury Control and Disability Prevention Program. *Method for evaluation of bicycle helmet projects: a manual for local programs*. 1990.
- [9] Rodgers GB. *Bicycle and bicycle helmet use patterns in the United States: a description and analysis of national survey data*. Washington, DC: US Consumer Product Safety Commission, 1993.
- [10] Gilchrist J, Schieber RA, Leadbetter S, et al. Police enforcement as part of a comprehensive bicycle helmet program. *Pediatrics* 2000; 106:6-9.
- [11] Centers for Disease Control and Prevention. Injury control recommendations: bicycle helmets. *MMWR* 1995;44(No. RR-1).
- [12] National SAFE KIDS Campaign. *Safe kids cycle smart*. Washington DC: CNMC Child Ventures, 1994.
- [13] Sosin DM, Sacks JJ, Webb KW. Pediatric head injuries and deaths from bicycling in the United States. *Pediatrics* 1996;98:868-70.
- [14] Howland J, Sargent J, Weitzman M, et al. Barriers to bicycle helmet use among children. *Am J Dis Child* 1989;143:741-4.
- [15] Cody BE, O'Toole ML, Mickalide AD, et al. *A national study of traumatic brain injury and wheel-related sports*. Washington, DC: National SAFE KIDS Campaign, May 2002.
- [16] Finnoff JT, Laskowski ER, Altman, KL, et al. Barriers to bicycle helmet use. *Pediatrics* 2001;108:e4.
- [17] Liller KD, Morissette B, Noland V, et al. Middle school students and bicycle helmet use: knowledge, attitudes, beliefs, and behaviors. *J Sch Health* 1998;68(8):325-8.
- [18] Harlos S, Warda L, Buchan N, et al. Urban and rural patterns of bicycle helmet use: factors predicting usage. *Inj Prev* 1999;5:183-8.
- [19] Hendrickson SG, Becker H. Impact of a theory based intervention to increase bicycle helmet use in low income children. *Inj Prev* 1998;4:126-31.
- [20] Federal Highway Administration. *Bicycle safety-related research synthesis*. Washington, DC: U.S. Department of Transportation, 1995. Publication No. FHWA-RD-94-062.
- [21] Logan P, Leadbetter S, Gibson RE, et al. Evaluation of a bicycle helmet giveaway program-Texas, 1995. *Pediatrics* 1998;101:578-582.
- [22] Hendrickson SG, Becker H. Impact of a theory based intervention to increase bicycle helmet use in low income children. *Inj Prev* 1998;4:126-131.
- [23] Rivara FP, Astley SJ, Clarren SK, et al. Fit of bicycle safety helmets and risk of head injuries in children. *Inj Prev* 1999;5:194-7.
- [24] Smith TA, Tees D, Thom DR, et al. Evaluation and replication of impact damage to bicycle accidents. *Proceedings of the 37th Annual Conference, Association for the Advancement of Automotive Medicine*. Barrington, IL: Association for the Advancement of Automotive Medicine: 1993.
- [25] Rodgers GB. Effects of state helmet laws on bicycle helmet use by children and adolescents. *Inj Prev* 2002;8:42-46.

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