



# AOTA Evidence Briefs

## Brain Injury

*\*A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

### BI #7

## **Helmets are effective in reducing head injury across age groups, type of accident, and type and certification of helmet**

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Thompson, D. C., Rivara, F. P., & Thompson, R. S. (1996). Effectiveness of bicycle safety helmets in preventing head injuries: A case-control study. *JAMA*, 276, 1968–1973.

### **Level: IIA1a**

Nonrandomized controlled trial, 2 groups, 20 or more participants per condition, high internal validity, high external validity

### **Why research this topic?**

There is strong evidence that helmets reduce bicycle-related head injuries. However, some important questions remain about the effectiveness of helmets under certain conditions.

### **What did the researchers do?**

The researchers, variously affiliated with the Group Health Cooperative of Puget Sound (Seattle, Washington) and the University of Washington (Seattle), examined the protective effect of bicycle helmets among members of four age groups, by helmet type and certification standards, and in crashes involving motor vehicles. The researchers monitored the logs and records of the emergency departments in seven Seattle-area hospitals for 30 months (March 1, 1992 to August 31, 1994) to identify all people injured while on a bicycle. Their efforts generated 3,849 names. They reviewed the records of these people to obtain a description of the incident, information on whether the person wore a helmet, a description of the injuries, and other relevant data. They then sent questionnaires to the people within 1 to 2 weeks of the emergency department visit. The questionnaire sought information about the severity of the crash; whether the person wore a helmet at the time, and if so, details about the helmet; cycling experience; and more. The questionnaire had an 88% response rate (3,390 people). These respondents were sorted into 757 cases of those who had sustained head injuries (577 men and 180 women, 48.8% of whom were under 13 years of age) and 2,634 controls of all other cyclists (1,861 men and 773 women, 41.8% of whom were under 13 years of age).

The outcome area of interest was the *protective effect of the helmet* (1) for five age groups (less than 6 years old, 6 to 12 years old, 13 to 19 years old, 20 to 39 years old, and 40 years old and older); (2) in crashes involving motor vehicles; (3) according to type of helmet (hard-shell, thin-shell, or no-shell); and (4) by certification of helmet (Snell Memorial Foundation, American National Standards Institute [ANSI], or American Society for Testing and Materials [ASTM]).

### **What did the researchers find?**

Helmets provided a protective effect, reducing risk by 69% for any head injury, 65% for brain injury, and 74% for severe brain injury, compared to an emergency department comparison group. This effect was present across all age groups. Further, they were equally effective in protecting participants in crashes involving motor vehicles and crashes not involving motor vehicles. There were no **significant** (*see Glossary*) differences in protective effect among the hard-shell, thin-shell, or no-shell types nor among the Snell-, ANSI-, or ASTM-certified helmets.

## What do the findings mean?

■ For *therapists and other providers*, the findings suggest that, regardless of type, helmets provide substantial protection against head injuries for cyclists of all ages involved in crashes and motor vehicle accidents.

The findings should encourage confidence in programs that promote the use of helmets by cyclists of all ages. The potential savings in human and financial costs warrant such confidence.

## What are the study's limitations?

The researchers' method of selecting study participants was not systematic; the members of each group were matched according to a variety of factors. This flaw in the study's design lowers confidence that the results can be attributed to the intervention.

The study provides useful information, and the findings are generalizable to the population of persons who ride bicycles.

## Glossary

**significance (or significant)**—A statistical term, this refers to the probability that the results obtained in the study are not due to chance, but to some other factor (such as the treatment of interest). A significant result is one that is likely to be generalizable to populations outside the study.

Significance should not be confused with clinical effect. A study can be statistically significant without having a very large clinical effect on the sample. For example, a study that examines the effect of a treatment on a client's ability to walk, may report that the participants in the treatment group were able to walk significantly longer distances than the control. However, if you read the study you may find that the treatment group was able to walk, on average, six feet, while the control group was able to walk, on average, five feet. While the outcome may be statistically significant, a clinician may not feel that a one foot increase will make his or her client functional.

■ Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: *Uniform Terminology for Occupational Therapy Practice—Third Edition* (AOTA, 1994) and *International Classification of Functioning, Disability and Health (ICIDH-2)* (World Health Organization [WHO], 1999). More recently, the *Uniform Terminology* document was replaced by *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2002), and modifications to *ICIDH-2* were finalized in the *International Classification of Functioning, Disability and Health* (WHO, 2001).

This work is based on the evidence-based literature review completed by Beatriz C. Abreu, PhD, OTR, FAOTA, and colleagues.

For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.

