



Helmet Use in Preventing Head Injuries in Bicycling, Snow Sports, and Other Recreational Activities and Sports

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Recreational activities and sports are a common and popular way for youth to enjoy physical activity; however, there are risks related to physical injury. Injuries can potentially result in death and long-term disability, especially from traumatic brain injury. Helmet use can significantly decrease the risk of fatal and nonfatal head injury, including severe traumatic brain injury and facial injuries when participating in recreational sports. The most robust evidence of helmet effectiveness has been demonstrated with bicycling and snow sports (eg, skiing, snowboarding). Despite this evidence, helmets are not worn consistently with all recreational sports. A multipronged approach is necessary to increase helmet use by children and youth participating in recreational sports. This approach includes legislation and enforcement, public educational campaigns, child education programs, and anticipatory guidance from clinicians. This policy statement guides clinicians, public health advocates, and policymakers on best practices for increasing helmet use in recreational sports, including bicycling and snow sports.

Recreational sports and physical activities continue to increase in popularity, with an estimated 218.5 million United States residents older than 6 years engaging in these activities in 2018.¹ The benefits of sports for youth are well established^{2,3}; nonetheless, there are risks related to physical injuries, including morbidity and mortality from traumatic brain injuries (TBIs). Injury rates from recreational sports among participants 5 years and older are highest for children 5 through 14 years of age (76.6/1000 persons) and youth 15 through 24 years of age (55.6/1000 persons).⁴ Sports-related activities account for an increasing proportion of TBIs.⁵ Children and adolescents engage in a variety of recreational activities using

abstract

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motorized and nonmotorized, wheeled devices, as well as engaging in nonwheeled activities. Some recreational sports associated with risks for head injuries include bicycling,^{6,7} skiing and snowboarding (henceforth collectively termed “snow sports”),⁸ ice skating,⁹ and equestrian sports.¹⁰ All-terrain vehicles are addressed in a separate policy statement and technical report, currently in development.

Serious head injuries, including TBIs, from recreational sports can often be prevented or the injuries can be mitigated. Helmet use in sports and recreational activities significantly decreases the risk of nonfatal and fatal head injuries and facial injuries.¹⁰⁻¹⁴ Despite the strong evidence for the effectiveness of helmets in decreasing head and facial injuries, their use is not consistent among sports participants.^{10,15-20} Helmet use is also cost-effective in the prevention of head injuries.^{21,22} To increase helmet use, a multipronged approach including legislation,²³⁻²⁵ enforcement of laws and rules,²⁶ public educational campaigns,²⁷ child education programs,^{28,29} anticipatory guidance from clinicians,^{30,31} and equitable access to helmets will be required. The purpose of this policy statement is to guide clinicians, public health advocates, and policymakers regarding the evidence-based best practice for helmet use and promotion in recreational sports, including bicycling and snow sports. This policy statement accompanies the technical report, “Helmet Use in Preventing Head Injuries in Bicycling, Snow Sports, and Other Recreational Activities and Sports.” Although concussions are an important type of head injury, concussions and their prevention are not addressed here because this topic is addressed in another

American Academy of Pediatrics clinical report, “Sport-Related Concussion in Children and Adolescents.”³²

Bicycle riding is one of the leading causes of sport-related head injuries in pediatrics,⁵⁻⁷ resulting in an estimated 26 000 emergency department visits annually.³³ Snow sports (ie, skiing and snowboarding) are another leading cause of recreational sport-related head injury, and the risk of TBI is increased if the participant is not wearing a helmet.^{8,13} Among other recreational sports, ice skating^{9,34} and equestrian sports¹⁰ are also associated with risks of head injury.

The effectiveness of helmets in decreasing head and facial injuries has been best studied among bicyclists. A Cochrane review based on 5 international studies reported that helmets decreased the risk of head, brain, and severe brain injury by 63% to 88% for bicyclists of all ages and calculated a summary adjusted odds ratio (OR) of 0.31 (95% confidence interval [CI]: 0.26–0.37).¹² Two more recently published meta-analyses reported similar protective effects of helmets against bicycle-related head and facial injuries.^{35,36}

Helmets are also effective in decreasing the risk of head injuries in snow sports. One meta-analysis including 6 studies reported that helmets decreased the risk of head injuries with a pooled OR of 0.58 (95% CI: 0.51–0.77),³⁷ and another based on 9 studies reported a pooled OR for head injury of 0.66 (95% CI: 0.55–0.79).³⁸ The evidence on helmets for decreasing head injuries in other recreational sports (eg, skating, ice skating, nonmotorized wheeled sports) also reports decreased odds for head injury in helmeted compared with

unhelmeted children, but the research is more limited.^{7,20,39,40}

To ensure optimal protection against head injury, proper helmet fit is important because multiple sizes are available in the consumer market. For a correct fit, the helmet should be positioned on the head so it sits low on the forehead with the child able to see the brim of the helmet when looking upward. The helmet should sit parallel to the ground when the head is upright and should have any pads adjusted (ie, installed or removed) for a snug fit. The chin strap should be comfortably secure, allowing only 2 fingers aligned side by side to fit between the chin and the strap. The helmet should then be secure enough so it will not come off or move forward over the eyes with shaking of the head.⁴¹

Despite the evidence for the effectiveness of helmets in decreasing the risk of head and facial injuries in recreational sports, helmets are not consistently worn. For children 5 through 17 years of age, a 2012 study of United States bicycle helmet use reported that only 42% always wore a helmet, and 31% never wore a helmet.¹⁸ A national study of skateboarders and snowboarders younger than 18 years reported that 52% of children injured were unhelmeted.²⁰ Reported reasons for not wearing a helmet when participating in recreational sports include: cost, discomfort, and lack of belief helmets are necessary to prevent injury.⁴²⁻⁴⁵ It is important to note that adult helmet-wearing, younger child age (4 through 12 years old), and female sex have been associated with increased helmet-wearing in children.^{18,42,44}

To increase helmet use and decrease the risk of head injuries in children and youth participating in recreational sports, there is

evidence for several effective approaches. Legislation resulting in increased helmet use in children has been primarily studied in bicyclists.^{16,25,46} As of 2022, 21 states and the District of Columbia have bicycle helmet laws applying to children 17 years or younger, although age requirements vary by state.⁴⁷ A 2010 Cochrane narrative review examined the effectiveness of bicycle helmet legislation for children and concluded legislation is effective in increasing helmet use and decreasing head injuries.⁴⁸ School- and community-based bicycle safety programs, including promoting helmet use, have also been effective in increasing bicycle safety knowledge and helmet use, although the long-term effects of these programs on helmet use has not been reported.^{26,28,29,49} Anticipatory guidance from pediatric clinicians has also been shown to be effective in increasing bicycle helmet use.^{30,31} A prospective randomized study of 2183 children (fifth to ninth grade) among 12 pediatric practices with interventions focused on either alcohol and cigarette use or bicycle helmets, gun storage, and seatbelt safety found only bicycle helmet use improved when compared with the previous year.³¹

RECOMMENDATIONS TO INCREASE HELMET USE AND DECREASE HEAD INJURIES BY CHILDREN AND YOUTH PARTICIPATING IN RECREATIONAL SPORTS

1. Helmet use:

- a. Children and youth, as well as their adult caregivers, should always wear an appropriate and correctly fitting sport helmet during participation in recreational sports, including, but not limited to, bicycling, snow sports, ice skating, and equestrian sports. Because of

the differences in engineering, helmet types should match the sport for which they are designed. Multisport helmets can be used for bicycling, as well as other recreational sports (eg, skiing, snowboarding); however, bicycle helmets should be used only for bicycling and not for other activities.

- b. To promote helmet use, children can be encouraged to choose their own helmet and decorate it to reflect their individuality. Reflective stickers and/or lights (eg, light-emitting diode lights) can also be added if not already on the helmet to increase visibility of the child when bicycling on the road.
 - c. The helmet should be replaced if involved in a crash, damaged, or outgrown. Helmets should also be replaced every 5 years or in the time frame recommended by the manufacturer in the instructions, because the materials can degrade over time.
 - d. Preferably, when possible, use of previously owned helmets should be discouraged because the integrity and age of the helmet may be unknown.⁴¹
2. Anticipatory guidance from clinicians to patients and families:
- e. Pediatric clinicians in the primary care, emergency department, and tertiary care settings should inform parents and patients of the importance of wearing helmets during recreational activities and sports, including discussing age- and sport-appropriate helmet use as part of injury-prevention anticipatory guidance. The Centers for Disease Control and Prevention has helmet information sheets for the lay public focused on different team and recreational sports (<https://www.cdc.gov/healthyschools/bam/safety/helmets.html>).
 - f. Parents and adult caregivers should also be advised to wear helmets to model safe behavior, especially because such modeling has been shown to be a predictor for helmet use in children and youth.^{18,41,43}
 - g. Clinicians should know their state and municipal laws regarding helmet use and age limits.
3. Education of the lay public:
- h. The effectiveness of helmets in reducing the risk of head injury, including TBIs, should be promoted among the lay public. This education can be accomplished through public health advertising campaigns, including public service announcements, and through sports organizations.^{50–53} State and local legislation and regulations should also be included in these educational campaigns.
4. Advocacy:
- i. More comprehensive and consistent legislation and regulations regarding helmet use in sports, comparable to child safety restraint laws and motor vehicles,⁵⁴ will be important to increase helmet use and decrease head injuries on a broad scale. State legislation and local regulations are effective in increasing helmet use and decreasing head injuries.^{25,46} At the time of this publication, only 21 states and the District of Columbia have bicycle helmet legislation, which applies only to children and teenagers.⁴⁷ There is no legislation regarding helmet use for other recreational sports.
 - j. Policymakers, public health advocates, and clinicians interested in advocacy should advocate for stronger

legislation and regulations regarding helmet use, especially for bicycling, snow sports, and equestrian activities.

- k. Clinicians and public health advocates can encourage school districts to require bicycle helmet use when bicycling to and from school.⁴¹
 - l. Retail outlets and rental facilities should be encouraged to sell and/or rent affordable helmets when they sell recreational sports equipment (eg, bicycles, skis, snowboards, ice skates, equestrian equipment).
 - m. Payers should be enlisted to cover the cost of sports helmets as durable medical equipment given their cost-effectiveness,^{21,22} as has been done in some cases for car safety seats for children. This may also help address inequities in helmet use due to cost.
5. Enforcement:
- n. Although legislation is important in increasing helmet use, enforcement is an essential aspect. In addition to issuing tickets for helmet legislation noncompliance, alternative strategies including having offenders attend a bicycle safety class and rewarding helmet wearers for compliance could be considered.²³
 - o. Pediatric clinicians may collaborate with education and law enforcement officials as well as community-based organizations to develop and implement community-specific programs to improve enforcement.
6. Helmet promotion programs:
- p. Multifaceted injury prevention programs have demonstrated increased helmet use in children and may be school-, community-, or health care

setting-based.^{23,24,26,28,31,55}

These programs can involve one or more of these components: (1) education, (2) helmet giveaways, and (3) enforcement of existing helmet legislation.²⁶

- q. Institutions and medical centers should consider providing helmets at cost or gratis to patients, which could be a standalone program or part of a larger injury prevention program (eg, Safety Store).
7. Research:
- r. Epidemiologic research: Despite the popularity of recreational sports in pediatrics, there are limited data on the epidemiology of and helmet effectiveness for specific types of injuries within these sports. This includes activities such as skateboarding and riding scooters. Understanding the number of annual injuries by age group, body areas affected, and severity of injuries are critical for informing and promoting injury prevention efforts. Even less well understood is the prevalence of helmet use in these sports, outside of bicycling.
 - s. Health inequities research: Studies focused on health inequities as related to injuries and barriers to helmet use should be conducted to inform interventions in high-risk populations.
 - t. Interventional research: For recreational sports besides bicycling, there are limited studies on interventions to increase helmet use in children and youth. Evaluation of best practices of multipronged injury prevention approaches to mitigating health disparities related to helmet use and injuries is also essential.

CONCLUSIONS

Recreational sports are an important part of the health and well-being of the developing child and adolescent. Although injuries occur commonly with these activities, the risk of head injuries, including TBIs, are decreased with helmet use. Helmets must be used in conjunction with safe behaviors when participating in recreational sports to prevent and mitigate head injuries. A multifaceted approach including legislation and enforcement, educational campaigns, school/community/health care setting programs, and anticipatory guidance will be necessary to promote and increase helmet use in pediatrics. Research on the epidemiology of recreational sports injuries, prevalence of helmet use, and effective interventions to increase helmet use will be important to inform future injury prevention efforts.

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ABBREVIATIONS

CI: confidence interval
OR: odds ratio
TBI: traumatic brain injury

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