Tykes and Bikes

Injuries Associated With Bicycle-Towed Child Trailers and Bicycle-Mounted Child Seats

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Objectives: To describe the incidence, type, and severity of injuries related to the use of bicycle-towed trailers for transporting children and to compare them with injuries associated with the use of child seats mounted on adult bicycles.


Results: There were 49 injuries to children during the 9-year study period (estimated 2338 injuries; 95% confidence interval [CI], 1121-3555): 6 were associated with the use of bicycle-towed trailers (an estimated 322 injuries; 95% CI, 158-486) and 43 were related to the use of bicycle-mounted child seats (an estimated 2015 injuries; 95% CI, 988-3042). The mean age of injured children was 2.4 years and 51% were male. A collision with a motor vehicle accounted for 2 (33%) of the injuries associated with bicycle-towed trailers; 3 (50%) of the injuries were the result of falls. A motor vehicle was involved in 4 injuries (9%) related to the use of bicycle-mounted child seats (Fisher exact test, \( P < .13 \) vs bicycle-towed trailers); 31 (72%) were the result of falls (Fisher exact test, \( P < .26 \) vs bicycle-towed trailers). Contact with a bicycle wheel or spokes was the mechanism of 1 injury associated with the use of a bicycle-towed trailer (17%) and the mechanism for 8 (19%) of the injuries associated with the use of a bicycle-mounted child seat (Fisher exact test, \( P < .69 \)). The head or face was the most common site of injury, accounting for 5 (83%) injuries among those riding in bicycle-towed trailers and 21 (49%) injuries among children in bicycle-mounted child seats (Fisher exact test, \( P < .12 \)). All 6 children injured in bicycle-towed trailers had contusions/abrasions or lacerations; 22 (51%) children injured using bicycle-mounted child seats had contusions/abrasions or lacerations and 9 (21%) had fractures. Two children (33%) injured in bicycle-towed trailers and 2 (5%) injured in bicycle-mounted child seats were admitted to the hospital (Fisher exact test, \( P < .06 \)).

Conclusions: When compared with bicycle-mounted child seats, there were fewer reported injuries to children associated with the use of bicycle-towed trailers. Motor vehicle involvement and need for hospital admission were similar among injured children in both groups, and the head or face was the most common site of injury. These data imply that ongoing surveillance efforts to identify injuries associated with use of bicycle-towed child trailers are warranted and that bicycle helmets should be worn by children riding in bicycle-towed child trailers and in bicycle-mounted child seats.


Editor’s Note: It looks pretty clear to me; don’t turn your back to the child. Walking with him or her is much healthier, and you can even talk and walk.

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Injuries related to the use of bicycle-mounted child seats have been described.\(^1\)\(^2\) However, the safety of bicycle-towed child trailers has not been reported. Bicycle-towed child trailers are an alternative to bicycle-mounted child seats for travel with young children on bicycles. We were interested in learning the epidemiology and characteristics of injuries to children associated with the use of bicycle-towed trailers. We compared injuries to children associated with bicycle-towed trailers with injuries related to the use of bicycle-mounted child seats.

RESULTS

From 1990 to 1998 there were 6 children reported to NEISS who were injured while riding in bicycle-towed trailers, and 43 children with injuries related to the use of a bicycle-mounted child seat. Using the NEISS weightings, there were an estimated 322 injuries associated with the use of a bicycle-towed trailer (95% CI, 158-486) and an estimated 2015 injuries re-
PARTICIPANTS AND METHODS

Data were obtained from the US Consumer Product Safety Commission (CPSC) Injury Information Clearinghouse for 1990 through 1998 for injuries related to the use of bicycle-towed trailers reported to the National Electronic Injury Surveillance System (NEISS). As there is no specific product code for bicycle-towed trailers, cases were identified using the keyword trailer and each of the following: baby carrier (baby-mounted) (product code 1531), mountain or all-terrain bicycles and accessories (product code 5033), bicycles and accessories (excluding mountain) (product code 5040), and bicycles or accessories (product code 1202). We also reviewed CPSC data regarding injuries associated with the use of bicycle-mounted baby carriers (product code 1531). Narrative information was reviewed to prevent misclassification. Data included injury date, age, sex, diagnosis, most severely injured body part, disposition, site of injury event, if a motor vehicle was involved, if the child was admitted to the hospital, and a descriptive comment for each injury.

The NEISS receives reports from a probability sample of hospital emergency departments in the United States and uses the information to estimate national patterns of product-related injuries. Each emergency department participating in NEISS carries a statistical weight that reflects how representative it is of all US emergency departments. Calculation of a 95% confidence interval (CI) for the estimated number of injuries was based on estimated sampling error for NEISS data provided by the CPSC.3 The CPSC states that estimates smaller than 1200 may be inaccurate and must be interpreted with caution. Statistical analysis of categorical data was performed using the χ² and Fisher exact tests as appropriate based on sample size.

The data indicate the incidence of injury associated with the use of either bicycle accessory was low. However, injuries related to use of bicycle-towed child trailers were much less common (estimated 322 vs 2015). The mechanism of injury is presented in the Table. Two children riding in trailers were injured in collisions with motor vehicles; both were admitted to the hospital. In one child the injury was described as contusion/abrasion to the lower leg and in the other contusion/abrasion to the face. Motor vehicles were involved in 4 child seat–related injuries. There was no significant difference between groups in motor vehicle involvement in the injury event. Two children (5%) whose injuries were related to bicycle-mounted child seat use were admitted to the hospital (Fisher exact test, P<.06). Both children were injured when the bicycle on which the child seat was mounted fell over; a motor vehicle was not involved in either case. For one child the diagnosis was a parietal skull fracture and for the other a tibia fracture.

Using US Census estimates for 1995 and NEISS injury estimates of an average of 36 injuries related to bicycle-towed child trailers each year, the annual injury rate can be estimated as 0.2 per 100 000 children younger than 5 years. The annual injury rate for bicycle-mounted child seats is estimated at 1.3 per 100 000 children younger than 5 years. Because only those who use these products are exposed to injury related to their use, the actual rate of injury to those who use either of them is higher.

The use of bicycle-towed child trailers allows young children to accompany adults on bicycle rides. Bicycle-towed child trailers have been available in the United States since the late 1970s. While actual sales numbers are not available, it is estimated that the current annual sales are 75 000 trailers (written communication, M. Thompson, product manager, Chariot Carriers, Calgary, Alberta). We undertook this study to characterize the risks of injury to children associated with the use of bicycle-towed child trailers and to compare injuries related to their use with injuries associated with bicycle-mounted child seats. Data about injuries and injury risk allow pediatricians and parents to make informed decisions about the use of bicycle accessories designed to carry children.

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The mechanisms of the injuries associated with the use of bicycle-towed trailers include collisions with a moving object such as a motor vehicle or another bicycle, falls from the trailer, or contact with moving surfaces outside the trailer, which potentially include the riding surface or the bicycle wheel. A collision with a motor vehicle seems to have the most potential for serious injury associated with the use of a bicycle-towed trailer. This was the mechanism of injury for 2 of the 6 cases reported to NEISS. Although in both of these cases the injuries seemed to be minor (contusion/abrasion to the lower leg and contusion/abrasion to the face), the children were admitted to the hospital. It is unclear if the near-ground position of a bicycle-towed trailer places its occupants at risk because of poor visibility to motorists. In addition, the low position of a bicycle-towed trailer may place its occupants at risk for a crush injury from a motor vehicle. While this was not the mechanism of injury for any cases reported to CPSC, further data are needed to determine the true risk of motor vehicle-related injury.

Collisions with motor vehicles were an infrequent cause of injury for children riding in bicycle-mounted child seats, accounting for 4 of 43 cases in our series. Fewer injuries (<3%) were associated with motor vehicles in a study of children riding in bicycle-mounted child seats a decade ago.1

Bicycle-towed trailers have a low center of gravity and are very stable. The 2-wheel axle is perpendicular to the axle of the bicycle, which helps to prevent tipping. Many are designed with an attachment mechanism that prevents tipping, even if the bicycle is laid on the ground. Thus, the stability of the trailer is independent of the stability of the bicycle. Trailers contain a seat belt for restraining the occupant. Most trailers place their occupants less than 30 cm from the ground, limiting the height of falls from the trailer. Falls can occur if the child is not restrained or if an impact is sufficient to overcome the restraint. In 2 of 6 cases reported to NEISS the child fell from the trailer; it is not known if they were properly restrained. In one case the trailer tipped over when the bicycle and trailer hit a bump.

The mechanisms of fall injuries associated with bicycle-mounted child seats include falls from the seat, falls resulting from the bicycle tipping over, and falls resulting from the seat becoming detached from the bicycle. Most bicycle-mounted child seats are more than 0.6 m above the ground. Some children were injured in falls from the bicycle seat; more than half were injured when the bicycle tipped over. While many injuries were minor, one child had a parietal skull fracture and 20% had fractures of other bones.

Ankle and foot injuries accounted for 19% of injuries associated with bicycle-mounted child seats. In most of these cases, the extremity became caught in the spokes of the wheel of the bicycle on which the seat was mounted. This injury mechanism has been reported previously.1 To prevent ankle and foot injuries some seats are designed with foot wells; others use spoke guards. The efficacy of these designs to prevent injuries remains in question.

With a bicycle-towed trailer, the child’s foot is further from the wheel. The child sits in a 3-sided enclosure, preventing direct contact with either the bicycle or the trailer wheels. There were no foot injuries in the cases we report. In one case the child scraped her forehead on the rotating bicycle tire. Additional cases are needed to determine the risk of injury from the wheel and spokes among children riding in bicycle-towed trailers.

Because there were so few cases of injuries associated with bicycle-towed trailers, resulting in significant instability in the injury estimates, we chose to analyze the types of injury and the mechanisms of injury using the actual injury cases. As there were few cases available for analysis, comparisons between bicycle-towed child trailers and bicycle-mounted child seats must be interpreted with caution. Some injuries related to bicycle-towed trailers may not be identified as there is no specific product code for them. As described earlier, several search strategies were used to identify these cases. Despite the limitations to our analysis, these data are the best available for injuries related to the use of bicycle-towed trailers and bicycle-mounted child seats.

There were fewer reported injuries to children associated with the use of bicycle-towed trailers compared with the use of bicycle-mounted child seats. Motor vehicle involvement and hospital admission rates were similar among injured children in both groups. The head or face was the most common anatomical site of injury for children injured riding in both devices. These data suggest that bicycle helmets should be used by children riding in either a bicycle-towed trailer or in a bicycle-mounted child seat. Ongoing surveillance to describe injuries related to the use of bicycle-towed child trailers is needed before they can be recommended in place of bicycle-mounted child seats. The CPSC should assign a unique product code to these devices.

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REFERENCES