

# Helmet use reduces moderate or severe head injuries in youths riding ATVs and dirt bikes

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Neurosurgeons see many young people presenting with traumatic brain injuries following all-terrain vehicle (ATV) or dirt bike crashes. Often these youths were wearing no protective headgear at the time of the

crash. To quantify what differences helmet use makes, Vanderbilt University Medical Center researchers examined cases of young riders following such crashes. Their findings are contained in the article "The impact of helmet use on neurosurgical care and outcomes after pediatric all-terrain vehicle and dirt bike crashes: a 10-year single-center experience" by Jackson H. Allen and colleagues, published today in the *Journal of Neurosurgery: Pediatrics*.

The researchers focused on young people who were involved in ATV or dirt bike crashes and treated at the Vanderbilt University Medical Center between 2010 and 2019. Using an institutional pediatric trauma registry, the researchers identified cases and then manually reviewed full patient records. Cases were excluded from the study if the accident occurred during a competition event or if the status of helmet use was unrecorded.

In all, data from 680 patients ranging in age from 1 to 17 years (mean 11 years) were analyzed in this study; 230 patients (34%) had been wearing helmets at the time of the [crash](#) and 450 (66%) had not. Operators of the recreational vehicles were more likely to be wearing a helmet than passengers (44% vs. 10%), and male riders were more likely to be wearing a helmet than female riders (39% vs. 22%). A larger proportion of dirt bike riders were wearing helmets at the time of the crash than ATV riders (70% vs. 22%).

The researchers selected the following primary outcomes for this study: neurosurgical consultation, intracranial [injury](#) (including skull fracture), neurosurgical procedure, moderate or severe traumatic brain injury, and length of hospital stay. There was one secondary outcome: functional status at the last follow-up examination.

Riders not wearing a helmet at the time of the crash were more likely to receive tracheal intubation before arrival at the hospital (5% vs. 1%) and to be transferred to the intensive care unit from the emergency

department (20% vs. 10%) than riders wearing helmets.

Unhelmeted riders were more likely than helmeted riders to receive neurosurgical consultation (26% vs. 9%) and be diagnosed with moderate or severe traumatic brain injury (8% vs. 2%). Unhelmeted riders were also more likely to have a skull fracture (18% vs. 4%) or intracranial hemorrhage (16% vs. 4%). All these differences between patient groups were statistically significant.

During the study period, 12 unhelmeted riders (3%) required a neurosurgical procedure. Only one helmeted rider (0.4%) required a neurosurgical procedure (implantation of an intracranial pressure monitor). That dirt bike rider was struck by a vehicle traveling at highway speeds and died of neurotrauma. A second helmeted rider died of non-neurological injuries. Three unhelmeted riders also died, two of neurotrauma. Length of hospital stay was similar between helmeted and unhelmeted riders (median 2 days). More than 98% of riders achieved a good clinical outcome (Glasgow Outcome Scale score of 4 or 5) as of the last follow-up.

Following adjustment for the [rider's](#) age, sex, and driver status; vehicle type; and injury mechanism, multivariable analyses confirmed that helmet use was associated with statistically significant, reduced odds of neurosurgical consultation, intracranial injury, and moderate or severe traumatic brain injury.

As mentioned earlier, neurosurgeons see many cases of traumatic brain injury in [young people](#) involved in ATV and dirt bike crashes. In the present analysis, the researchers examined such crash cases in detail. The data they identified provide "substantial granularity to the study of neurosurgical injuries among recreational vehicle riders," showing differences in injuries depending on helmet use and reinforcing the importance of wearing helmets to reduce incidents of intracranial injury

and moderate or severe [traumatic brain injury](#) in the pediatric population. It is the authors' belief that neurosurgeons should work with [public health experts](#) to disseminate the findings of this study and those of future studies on the subject in the hopes of encouraging new campaigns and/or legislation encouraging helmet use.

Only one-third of ATV and dirt bike riders in this study wore helmets at the time of the crash; two-thirds did not. Imagine what differences in health status could be observed if those fractions were reversed

When asked about the findings of the study, Dr. Yengo-Kahn, responded, "For neurosurgeons treating pediatric trauma patients, these findings are not at all surprising. What is startling is that the rate of helmet use for patients presenting to the emergency department has not really changed and the consequences are obvious. Serially updating the literature on public health topics is critical in order to reinvigorate efforts to improve injury prevention. We hope the results of this study can do just that."

**More information:** The impact of helmet use on neurosurgical care and outcomes after pediatric all-terrain vehicle and dirt bike crashes: a 10-year single-center experience, *Journal of Neurosurgery: Pediatrics* (2021). [thejns.org/doi/10.3171/2021.6.PEDS21225](https://thejns.org/doi/10.3171/2021.6.PEDS21225)

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