

AMERICAN ACADEMY OF PEDIATRICS

Committee on Injury and Poison Prevention

All-Terrain Vehicle Injury Prevention: Two-, Three-, and Four-Wheeled Unlicensed Motor Vehicles

ABSTRACT. Since 1987, the American Academy of Pediatrics (AAP) has had a policy about the use of motorized cycles and all-terrain vehicles (ATVs) by children. The purpose of this policy statement is to update and strengthen previous policy. This statement describes the various kinds of motorized cycles and ATVs and outlines the epidemiologic characteristics of deaths and injuries related to their use by children in light of the 1987 consent decrees entered into by the US Consumer Product Safety Commission and the manufacturers of ATVs. Recommendations are made for public, patient, and parent education by pediatricians; equipment modifications; the use of safety equipment; and the development and improvement of safer off-road trails and responsive emergency medical systems. In addition, the AAP strengthens its recommendation for passage of legislation in all states prohibiting the use of 2- and 4-wheeled off-road vehicles by children younger than 16 years, as well as a ban on the sale of new and used 3-wheeled ATVs, with a recall of all used 3-wheeled ATVs.

ABBREVIATIONS. CPSC, US Consumer Product Safety Commission; ATV, all-terrain vehicle; AAP, American Academy of Pediatrics.

TWO-WHEELED VEHICLES

Miniature motorcycles intended for off-road use by children and adolescents have enjoyed wide popularity since the 1960s. However, manufacture of these vehicles is not regulated by federal motor vehicle safety standards. Neither the rider nor the vehicle is required to be licensed. Some of these cycles are small enough to be operated by children as young as 4 years, and many have been sold for use by school-aged children.¹

Minibikes, the smallest and most primitive of the 2-wheelers, are motorized bicycle-style frames that weigh <45 kg and are powered by engines operating at <4 horsepower. The more sophisticated and higher-powered *minicycles* are constructed with suspension systems and transmissions that resemble miniature motorcycles. *Trailbikes* or *trailcycles* are larger than minicycles and have power and design characteristics that make them suitable for rough terrain. They are generally only approved for off-road use. *Mopeds* are bicycles with small, unenclosed assist motors and top speeds of about 30 mph. They are intended for street use but, in many states, nei-

ther the mopeds nor their drivers must be licensed.² Two-wheeled vehicles generally have a short and relatively unstable wheelbase, small tires, slow acceleration, borderline brakes, and poor visibility in traffic (both of the cycle and by the cycle operator).^{2,3} *Motorcycles* are also 2-wheeled cycles, but require licenses in all states; these vehicles are not specifically discussed in this statement.

About 40 000 injuries related to 2-wheeled motorized off-road cycles were treated in emergency departments each year, 1994 through 1996.⁴ Of the injuries, 26% were sustained by children younger than 15 years. From 1990 through the first quarter of 1995, the US Consumer Product Safety Commission (CPSC) collected at least 50 reports of deaths related to minibike and trailcycle use. All but 1 of the victims were male, and 42% were 16 years of age or younger.⁵

Injury typically results from loss of control of the cycle after striking rocks, bumps, or holes, or from illegal on-road use. Mopeds are more often involved in collisions with other vehicles, presumably because they are legally used on-road, and frequently in urban areas.² Shoulder, knee, and leg injuries account for more than one third of emergency department visits for moped-related injuries. Head injuries account for about half of the deaths.⁵ Laryngotracheal trauma may result from driving across open fields into poorly visible wire fences. Thermal burns occur when engines are not enclosed, which is usual for mopeds.⁶ Deaths are more likely to be associated with racing or jumping.⁵

THREE- AND FOUR-WHEELED VEHICLES

All-terrain vehicles (ATVs) are motorized cycles, with 3 or 4 balloon-style tires, designed for off-road use on a variety of terrains. Although ATVs give the appearance of stability, the 3-wheeled design is especially unstable on hard surfaces. The ATV stability is further compromised by a high center of gravity, a poor or absent suspension system, and no rear-wheel differential. The danger is magnified because these vehicles can attain substantial speeds (30–50 mph).⁷

Most injuries associated with ATVs occur when the driver loses control, the vehicle rolls over, the driver or passenger is thrown off, or there is a collision with a fixed object.⁸ Studies in Alaska and Missouri have identified a number of risk factors for injury, including rider inexperience, intoxication with alcohol, excessive speed, and lack of helmet use.^{9,10} The recognition of the significant hazards associated with ATV use led to a federal investigation

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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and the acceptance of consent decrees by the ATV manufacturers in early 1988.¹¹ Under the decrees, the industry agreed to cease production and sale of new 3-wheeled ATVs (but not to recall old ones), to implement a rider-safety training program nationally, and to develop a voluntary standard to make ATVs safer. Warnings and age recommendations were included on the vehicle and in advertising. ATVs with engines >70 mL could be used only by children 12 years and older; "adult-sized" engines (those >90 mL) were not to be used by children or adolescents under 16 years.¹¹ Although the decrees did not prohibit the sale of the ATVs with engines <70 mL, which previously had been promoted for children younger than 12 years, none have been manufactured since 1986. After acceptance of the decrees, problems have occurred with some dealers not communicating the age restrictions to consumers, although pressure and enforcement by the CPSC have improved the situation. Nevertheless, children under 12 years still represent 15% of the deaths related to ATVs.¹²⁻¹⁴ It is probable that the most effective outcome of the 1988 consent decrees was the attendant publicity that led up to the decrees and the educational campaigns that occurred after them. The consent decrees expired in 1998. At that time, participating manufacturers agreed to an ATV Action Plan in which they agreed not to market or sell 3-wheeled ATVs, not market or sell adult-size ATVs to or for use by children younger than 16, promote training, and conduct safety education campaigns.¹⁵

The approximately 2.4 million ATVs still in use are associated with significant morbidity and mortality. Almost 2800 deaths have been attributed to ATVs (about 200 to 300 annually) since 1985.¹⁴ The risk of death, approximately .8 to 1.0 per 10 000 ATVs, has remained fairly steady since 1987. Annual emergency department visits for treatment of ATV-related injuries reached a peak of 108 000 in 1986 and declined after that to the present level of about 54 500.¹⁴ Children younger than 16 years account for 47% of the injuries in 1997 and >36% of the deaths since 1985.¹⁵ Head injuries account for most of the deaths, which usually are instantaneous.¹² Serious nonfatal injuries include head and spinal trauma, abdominal injuries, and multiple trauma.⁴ Abrasions, lacerations, and clavicle and extremity fractures are common and less serious.^{4,13} Some studies have suggested that children suffer more severe injuries. The severity of injury is the same for 3- and 4-wheeled ATVs.^{10,13,16} Currently, 4-wheeled vehicles account for 75% of the injuries, largely because of changes in the manufacture and sales of 3-wheeled ATVs after the 1988 consent decree, although many 3-wheeled ATVs remain in use. More injuries occur when ATVs are used for recreation than when they are used for nonrecreational purposes, for example, as farm vehicles.⁴

It is clear that deaths and injuries began to decline in 1986, possibly as an effect of the publicity before the consent decrees on the driving behavior of ATV users. A decline in sales, as well as diminished use by children, occurred after the decrees, but well before

the ban on 3-wheelers and design changes to make "safer" vehicles could have had a great effect.

RECOMMENDATIONS

The American Academy of Pediatrics (AAP) now updates its earlier recommendations^{10,17} to decrease death and injury related to the use of all 2-, 3-, and 4-wheeled ATVs:

1. Education, public and individual patient and parent, about the hazards of all ATVs should continue. (Besides benefiting the riders, it may increase public demand for greater regulation; eg, helmet laws and limitation on use by children.)
2. During anticipatory guidance, families should be asked, either by direct questioning or intake survey, about the kinds of recreational activities in which they engage. Just as those who have a swimming pool merit special counseling, so do families who engage in off-road vehicle use. The following points should be emphasized:
 - Off-road vehicles are particularly dangerous for children younger than 16 years who may have immature judgment and motor skills.¹⁰ Children who are not licensed to drive a car should not be allowed to operate off-road vehicles.
 - Injuries frequently occur to passengers, therefore riding double should not be permitted.
 - All riders should wear helmets, eye protection, and protective reflective clothing. Appropriate helmets are those designed for motorcycle (not bicycle) use, and should include safety visors/face shields for eye protection.
 - Parents should never permit the street use of off-road vehicles, and nighttime riding should not be allowed.
 - Flags, reflectors, and lights should be used to make vehicles more visible.
 - Drivers of recreational vehicles should not drive after drinking alcohol. Parents should set an example for their children in this regard.
 - Young drivers should be discouraged from on-road riding of any 2-wheeled motorized cycle, even when they are able to be licensed to do so, because they are inherently more dangerous than passenger cars.
3. Although the consent decrees required some equipment modifications to make ATVs safer, further changes have been suggested. They include the following:
 - Install seat belts on 4-wheeled ATVs and require that the vehicles also have a roll bar to prevent the driver from being crushed by the weight of the vehicle in the event of a rollover.
 - Headlights that automatically turn on when the engine is started should be routinely installed on all ATVs to improve visibility by other vehicles.
 - Speed governors (devices that limit maximum speed) should be installed on ATVs used by inexperienced operators.
 - Efforts should be made to design ATVs so that they cannot carry passengers.
 - Engine covers on small 2-wheeled vehicles, such as mopeds and minibikes, could reduce

burn injuries resulting from body contact with the engine and exhaust system. A sturdy leg guard could avoid injuries from sideswiping solid objects or being pinned to the ground.

All of these proposed modifications should be thoroughly evaluated before use and monitored after introduction.

4. Laws should be passed in all states requiring motorcycle-style helmets for off-road use as well as for on-road use. Motorcycle helmet laws have been proven to increase helmet use, and helmet use has been proven to reduce death and serious head injuries.^{16,18}
5. Many injuries are caused by various disruptions in the driving surface such as, bumps and holes. Developing and maintaining trails for the use of off-road vehicles may help reduce injury rates.
6. Prehospital care networks and emergency services should be improved in rural areas, which may minimize the effects of injuries and reduce deaths.¹¹
7. The AAP recommends a ban on the sale of all 3-wheeled ATVs, new and used, and a recall with a refund for present owners of the 3-wheeled models.
8. Laws should prohibit the use of ATVs, on- or off-road, by children and adolescents younger than 16 years. An automobile driver's license, and preferably some additional certification in ATV use, should be required to operate an ATV. The safe use of ATVs requires the same or greater skill, judgment, and experience as needed to operate an automobile.
9. ATVs should not be used after sunset or before sunrise, and carrying passengers should not be allowed. These provisions should be included in legislation.
10. Pediatricians should advocate for the passage of the AAP's model bill¹⁹ that:
 - prohibits the use of ATVs, on- or off-road, by children and adolescents younger than 16 years;
 - requires an automobile drivers' license, and preferably some additional certification in ATV use;
 - prohibits the use of ATVs on public streets and highways;
 - prohibits passengers from riding on ATVs;
 - prohibits operating an ATV under the influence of alcohol; and
 - prohibits the use of ATVs between sundown and sunrise.

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