

## ORIGINAL ARTICLE

## All-terrain vehicle injury in children: strategies for prevention

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*Injury Prevention* 2004;10:303–307. doi: 10.1136/ip.2003.004176

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**Objective:** A variety of educational efforts, policies, and regulations have been adopted to reduce all-terrain vehicle (ATV) injury in children. Despite this, ATV use by children continues and serious injuries are common. The purpose of this study was to investigate the knowledge, practices, and beliefs of ATV users to help develop effective educational strategies to promote safer ATV use.

**Design:** Focus groups were conducted to characterize participant ATV use and safety awareness as well as to explore avenues for prevention. Feedback on draft ATV safety public service announcements was elicited. Themes of transcribed focus group data were summarized.

**Setting:** Rural state with high ATV use and injury rates.

**Subjects:** Adult and adolescent ATV users.

**Interventions:** None.

**Main outcome measures:** Summaries of focus group discussions.

**Results:** ATV riders frankly discussed current use and safety behaviors and were aware of some ATV risks. Youths felt that age specific regulation was unlikely to be a helpful strategy. Participants endorsed messages demonstrating graphic consequences as likely to get the attention of young riders regarding risks. Educational settings were suggested, including hunter and driver safety classes.

**Conclusions:** Efforts to improve ATV safety awareness should clearly show pediatric ATV injury risk and safety practices. Campaigns must also show realistic understanding of current use practices to be credible for users. Messages emphasizing the consequences of ATV use were endorsed as most likely to have impact. Approaches based on age based restrictions were considered unrealistic and alternative strategies were suggested.

All-terrain vehicle (ATV) injury in children is a serious and increasing problem in the United States. In 1997, there were an estimated 54 700 ATV related injuries treated in US emergency rooms, including an estimated 21 132 in children under age 16 years. By 2001, the number of people treated in US emergency rooms for ATV related injury had increased to 111 700; including an estimated 33 071 children under age 16 years.<sup>1</sup> In the 1990s, there were an estimated 273 deaths each year in the US resulting from ATV related injury, more than a third of whom were children.<sup>2</sup>

With the introduction and rapid rise in popularity of ATVs in the 1980s, a dramatic increase in ATV related injury was seen, including a large proportion of pediatric injuries.<sup>3</sup> The US Consumer Product Safety Commission (CPSC) responded and entered into a consent decree with ATV manufacturers that banned production of three wheeled ATVs and prescribed a number of safety related measures, including warning labels and ATV safety programs. In spite of these efforts, there are numerous recent reports of striking increases in pediatric injuries.<sup>4–7</sup> The CPSC reported that between 1997 and 2001, overall exposure to ATVs in terms of numbers in use, number of drivers, and driving hours has increased by 36% (number of drivers) to 50% (number of driving hours). During the same period, however, a disproportionate increase of 104% in injuries occurred.<sup>1</sup> Pediatric exposure also increased by 9.1% in the number of riders and 34.2% in riding hours for children under age 16.<sup>1</sup> Although children under 16 make up only 14% of riders, they comprise 35% of all deaths caused by ATVs, and demonstrate a risk of death 4.5–12 times greater than adult comparison groups.<sup>3–8</sup> In addition to age, other risk factors including male sex, use of three wheeled rather than four wheeled vehicles, on-road

use, and lack of helmet use are associated with increased risk of injury and death. Helmets have been shown to reduce non-fatal injury by up to 64% and mortality risk by 42%,<sup>9</sup> but studies suggest that even among previously injured patients, helmet use is low and risk taking behavior persists.<sup>10</sup> Rural states tend to have higher rates of ATV use and injury. Arkansas, where this study was conducted, has the fifth highest overall rate of ATV injury deaths in the country and the highest rate of injury for females up to age 16 years.<sup>11</sup>

A number of strategies to decrease ATV injuries in children have been attempted. Dealers have offered safety education courses at the time of sale since the period of the consent decree, but overall use of these courses is low, estimated at only 4% of injured drivers and 11% of all drivers in a recent study.<sup>9</sup> To promote safer use among adults and discourage use by youth, various forms of legislation have also been considered. A 1989 model bill introduced by the American Academy of Pediatrics (AAP) is a standard for the goals of ATV safety legislation.<sup>13–14</sup> Components of this bill include: (1) prohibition of children under age 16 from operating ATVs; (2) license, insurance, and registration requirements for ATV operators; (3) a ban on ATV use on public roads; (4) motorcycle style helmet, eye protection, and safety clothing requirements; (5) prohibiting passengers on ATVs; and (6) banning ATV operation while intoxicated. A recent update advocated the use of seatbelts, roll bars, and automatic headlights.<sup>15</sup> Most states have some regulation of ATV use, typically involving limits on vehicle size and restrictions to use off public roadways; 21 states also require helmets and

**Abbreviations:** AAP, American Academy of Pediatrics; ATV, all-terrain vehicle; CPSC, Consumer Product Safety Commission; PSA, public service announcement

other safety equipment.<sup>11</sup> Although helmet use has been shown to be higher when required by law, it was not impacted by warning labels or participation in training courses.<sup>16</sup> Death rates in states without either helmet/safety equipment or machine related laws are about twice that of the rest of the country.<sup>11</sup> Another study, however, called for stricter, better enforced laws including age limits and licensing to decrease mortality.<sup>17</sup>

In summary, despite efforts at education and adoption of ATV safety policies by governmental, health care, and advocacy groups, the extent to which children and families are aware of the risks associated with ATVs is currently unclear. Usage and injury patterns do not indicate widespread knowledge of safe practice: injuries are increasing and over 90% of injuries and deaths to children under 16 years occur on ATVs that exceed the AAP and CPSC consent decree size recommendations.<sup>3</sup> If misconceptions exist in the community regarding ATVs, or if users are unaware of the risks associated with pediatric use of the vehicles, new strategies may be necessary. This paper summarizes data from focus groups investigating the knowledge, practices, and beliefs of ATV users conducted to develop more effective strategies to promote safer ATV use.

## METHODS

### Design, setting, and informants

Data presented here were collected by a multidisciplinary task force organized to review and respond to injuries among children admitted to a regional referral center for pediatric trauma in central Arkansas. The task force, comprising physicians, nurses, health educators, and others, wished to develop a more in depth understanding of the usage patterns and safety behaviors of ATV users and to get user assistance in refining the educational message in several draft public service announcements (PSAs). Four focus groups were assembled using a purposive, typical case sampling strategy. The local institutional review board approved the study and informed consent was obtained before focus group participation.

### Participants

A total of 23 children and 17 adults participated. Two sessions targeted adult ATV users who were active in farming or hunting activities and were members of local Farm Bureau or hunter safety educator groups. Two took place in rural community schools targeting adolescents in hunter or agricultural education programs. Demographic information on the participants is presented in table 1. The mean age for youth participants was 14 years (range 12–18 years) and 48 years (range 30–60 years) for adults. All participants were white; 24 (60%) were male.

### Procedure and data analysis

Data from the key informants were gathered during semistructured, audiotaped focus group sessions. The discussions were held in several locations to facilitate participation, including rural and urban venues. The focus group moderator and assistant moderator were health educators with experience in the use of qualitative methodologies for program evaluation. A brief anonymous survey designed to obtain demographic and ATV use data was completed at the beginning of the session. A structured interview guide developed by content experts was used to direct the flow of conversation. Participants received US\$40 as incentive for participation.

Data analysis followed accepted qualitative analytic techniques.<sup>18–20</sup> Preliminary analysis began in a debriefing session between the moderators immediately following each focus group. Audiotaped focus group sessions were transcribed into written form and managed using HyperRESEARCH version

**Table 1** Characteristics and use patterns of focus group participants

	Adults = 17		Youths = 23		Total = 40	
	No	%	No	%	No	%
People in household who drive or ride*						
Adults	13	76.4	20	86.9	33	82.5
Teens (13–18)	8	47.0	19	82.6	27	67.5
Children (2–12)	2	11.7	20	60.8	22	55.0
Passengers present*						
Yes	8	47.0	19	82.6	27	67.5
No	9	53.0	3	13.0	12	30.0
Protective gear worn*						
Helmets						
Yes	4	23.5	3	13.6	7	17.5
No	12	70.5	12	54.5	24	60.0
Sometimes	0		7	31.8	7	17.5
Other gear						
Yes	10	58.8	3	13.6	13	32.5
No	4	23.5	9	40.9	13	32.5
Sometimes	2	11.8	9	40.9	11	27.5
Times used per week*						
1–3	13	76.4	12	52.2	25	62.5
≥4	4	23.5	10	43.4	14	35.0
Purpose of use*						
Recreation	4	23.5	9	39.1	13	32.5
Work	3	29.4	2	8.6	5	12.5
Both	10	58.8	11	47.8	1	52.5

\*May not add to total 100% due to missing or duplicate answers.

2.03, a content analysis software package for qualitative research.<sup>21</sup> A pediatrician, pediatric emergency physician, and trauma nurse, who were task force members, assisted in data analysis, generating reports from the transcribed data. These reports provided detailed information about behavior and attitudes of adolescent and adult ATV users and may be useful to guide interventions that may lead to more effective educational programs and, over time, reductions in pediatric ATV injury.

## RESULTS

Reported ATV use and training by the participants are summarized in table 1. Most participants (n = 27, 68%) reported that they rode with passengers, and more than half reported that children 12 years or younger rode or drove ATVs in their household. Protective gear was used inconsistently, if at all, especially by youth. More than half used the vehicles for both work and recreation, and youth more frequently used ATVs exclusively for recreation. Results of the discussions are organized into three thematic areas: (1) safety practices and risk perceptions of users, (2) potential effectiveness of legislative and other safety approaches, and (3) suggestions for educational and media campaigns. For result text with supporting quotations, please see the Appendix, which is available on the website at <http://www.injuryprevention.com/supplemental>.

### Safety practices and risk perceptions of adult and youth ATV users

Discussion about risks of ATV use revealed that most participants felt they were competent riders but admitted to occasional risk taking behavior. The youths in particular discussed showing off, stunts, and other risky behaviors with friends. Many youths rode with passengers while socializing, and felt larger vehicles with prominent seats seemed to invite multiple riders. Youths using ATVs for farm work reported they were less likely to have passengers.

The participants, adult or youth, were largely self taught or had minimal instruction by a parent or another adolescent when learning. Few, if any, of the parents had considered

instructing their children about typical off-road hazards such as gravel, steep hills, or crossing streams. The one participant who had taken formal training found it worthwhile, but most had only seen retailer brochures or videos.

Adult participants were concerned about safety of the vehicles, especially for very young children. Personal experience with an ATV injury was a factor: many had either seen or been in a crash or near miss situation, or knew someone who had been hurt or killed on a vehicle. Tragic stories were related during each of the four focus groups, and both adults and youths felt that their safety behavior had improved with these experiences. The adults expressed concerns about adolescent risk taking and the increasing trend toward larger sized ATVs, particularly when used by children.

### Potential effectiveness of legislative and other safety approaches

The potential impact of several types of ATV related legislation was discussed in the groups, including age and vehicle size restrictions, licensing requirements, safety equipment requirements, and road use restrictions. Awareness of existing legislation in the state was also discussed.

Lively discussions ensued in all groups about the utility of age restrictions for ATV use. Participants were aware of manufacturer recommendations that children under 16 years not ride larger ATVs from dealer education or from warning stickers on their vehicles. Virtually all the users had begun riding at a younger age and some did not take this recommendation seriously—sometimes seeing it solely as a means of escaping liability. Both adult and adolescent groups felt that parental determination of maturity, in addition to the age or size of the child, was important in timing initiation of ATV use. The adults felt that parents had a major role to play in controlling the activities of their children on ATVs, but were concerned that parents do not always judge the danger of ATVs for children. Several participants commented on adults demonstrating poor safety choices for their children and concerns were expressed about parents' ability to accurately assess the maturity of their children.

Several individuals suggested that increased personal and parental liability might be an incentive for safer driving behaviors. Even the youth in the groups indicated that concerns about their liability influenced their behavior: one adolescent stated he was more careful when driving with passengers out of fear of being sued. Required licensing for ATV use was acceptable, especially to the adults. Youths felt that mandatory licensing would increase the numbers of adolescents with ATV safety training. Both adult and youth groups felt that size restrictions on ATVs were unlikely to be effective because of the relatively high cost of the vehicles. Especially for those using an ATV for farm work, the consensus of the group was that a larger vehicle would be needed, and costs of buying smaller ATVs for children would be prohibitive for most households. Adult participants felt helmet laws might be effective, even though most admitted to sporadic or no use of helmets themselves. The potential effectiveness of helmet laws was felt to be low because of the recent repeal of motorcycle helmet legislation in the study state, and both adults and youth felt that if motorcyclists were not required to use helmets that ATV helmet laws would be difficult to promote or enforce. Participants were generally aware of Arkansas restrictions on ATV use on paved roads from hunter safety courses, ATV manufacturers' warnings, or other sources. Adults, though, were unsure how to interpret the laws, describing them as vague and easy to evade. Parental support of existing legislation was important to the young: when parents had warned their teenage children of the potential fines for getting caught

riding on the road, the adolescents said they were more likely to avoid this behavior.

Several adults felt that engineering modifications to the vehicles would be effective, endorsing speed governors or other devices to help control and guide the vehicles as helpful. Others felt manufacturers could be encouraged by the market to produce safer ATVs through either litigation or public outcry.

### Suggestions for education and media messages

The need for increased awareness by the general public and particularly parents about the potential dangers of ATVs was endorsed by the groups, particularly regarding the use of larger ATVs by young children. Suggestions included improved access to ATV videos and education from dealers and expanded hunter education classes. Some parents suggested that safe ATV use be included in a driver's education classes and testing. Other potential avenues included public media and school closed circuit television, as well as print media including flyers, brochures, and posters for use in schools and high visibility areas such as sporting events or community festivals. The use of testimonials and group forums with teenagers and adults who had experienced an ATV injury was also suggested.

Youths felt they would listen to peers in a school assembly but would be unlikely to be attracted to posters in restaurants and other areas where they were socializing with friends. Messages that were direct and specific were preferred by the teenagers. Both adults and teenagers also liked the idea of "the President", "a senator", or a celebrity endorsing ATV safety. A variety of regional sports figures and female pop stars were mentioned, especially by teenaged boys, as attention grabbing and credible. ATV injury patients or their families were strongly preferred to medical personnel by the teenagers.

Several draft PSAs were presented to the groups for their comments, ranging from a message using a pediatric neurosurgeon discussing ATV risks, one with an adolescent crash survivor as the spokesman, focusing on his wheelchair, another using the theme that ATVs are not toys, and a final message using young children driving automobiles to comment on the maturity needed to drive motorized vehicles. Some of the messages included references to an age limit of 16 years for ATV use; these were unpopular with both adults and youths, even among the adults who generally felt adolescents were too immature to be using the vehicles. Most participants felt that the entire safety message might be lost in a negative response to such references. Instead of an age specific message, many of the participants favored a statement that ATVs should be used according to manufacturers' recommendations for size and age.

The most popular PSA with both adults and youths was the one emphasizing that ATVs are not toys. The message using younger children did not resonate with either group. Adolescents particularly preferred images with peers and did not like messages that seemed to target younger children, seeing them as somewhat condescending. The use of the physician spokesman was more popular with the adults; the adolescent was more interesting for the teenagers, suggesting that different types of messages may be necessary to reach all target groups. A combination of medical authority figures, patients, and high impact, graphic descriptions of the consequences of ATV use was advocated by all groups to attract teenagers to pay attention and "buy in" to the messages as personally relevant.

### DISCUSSION

All-terrain vehicle use and injury statistics indicate that educational efforts from dealers and current public health

messages may be inadequate to promote safer behavior. Our focus group interviews were conducted to obtain fresh insights from current users regarding new, more effective strategies.

Community based, multifaceted prevention programs have been effective in increasing knowledge, changing safety behaviors, and reducing injury rates in a variety of injury mechanisms.<sup>22–29</sup> Components of successful campaigns include development of community coalitions to guide activities, use of local surveillance data, intensive and tailored interventions, and careful, long term program evaluation.<sup>29</sup> Many injury prevention programs have included media education campaigns and distribution of discounted or free safety equipment. The World Health Organization's Safe Communities model that emphasizes a holistic, community participatory approach to injury prevention has been implemented with success in a number of nations.<sup>31–35</sup> Unique challenges will be faced in the development of comparable community campaign strategies for ATV safety given the prevalent use of the vehicles on private property and resulting difficulty in reliably observing behaviors, the diversity of vehicle types to address in messages, the relatively high costs of recommended motorcycle helmets, and the low use of safety equipment at baseline.

Several messages are evident in this study. Firstly, to be effective, media campaigns sponsored by public health agencies should focus on straightforward messages with a realistic portrayal of possible health consequences of ATV use for youth. Further, it will be critically important to avoid messages that fail to reflect knowledge of "real world" use of ATVs to maintain credibility for high risk groups. Teenage ATV injury patients and celebrities should be considered as potential campaign spokesmen. Other suggestions for educational activities were also suggested by the ATV users in this study, including use of youth forums at schools and inclusion of ATV safety content in hunter and driver education programs. Some legislative approaches, such as requiring licenses or helmet use for young ATV drivers, were deemed to be potentially acceptable, but age specific restrictions were unpopular. The groups considered targeted education of parents and youth to be the most likely means of reducing ATV injury in children. Rigorous evaluation will clearly be required to determine whether or not community education or media campaigns translate to improved ATV safety behaviors and decreased injury rates. We believe that the information reported in this study may help to inform and constructively shape these interventions, increasing their likelihood of success.

### Limitations

We recognize that this study has limitations. Participants in this study may reflect a somewhat more conservative group than the general population of ATV users, as they were drawn from organizations emphasizing safe farm or hunting practices. An older group of adolescent ATV users might have been more receptive to the prevention strategies including age limitations. This age group, however, was chosen to reflect the group with the highest injury rates in our state and is thus representative of high risk youth.

### CONCLUSIONS

Adult and teenage ATV users provided constructive input into planning for educational activities to improve ATV safety practices among youth. These suggestions can be used to tailor community level campaigns in attempts to increase knowledge about the risks of ATV use in children. These efforts, targeting both parents and children using the vehicles, are more likely to be effective if they incorporate

### Key points

- Participants in focus groups had started riding ATVs from an early age and had little, if any, formal training.
- Both adult and youth ATV riders felt that parents were the key to the promotion of safer riding among youth. Education about the risks of ATV use, especially for younger children, and incentives such as increased parental liability were suggested.
- Educational messages promoting strict age prohibition or those that did not reflect understanding of current ATV use patterns were discounted by the groups as ineffective.
- Messages with graphic portrayal of serious medical consequences of inappropriate use were preferred by youth in particular.
- Licensing, training requirements, and improved enforcement of existing laws were endorsed as acceptable and potentially effective strategies for ATV safety campaigns.

messages that resonate with users and families while providing information about safe practices.

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Supported by grants from the Bureau of Maternal and Child Health, (MCH #1H33 MC 00088 01) and by the Robert Wood Johnson Foundation (Injury Free Coalition for Kids # 047012).

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## LACUNAE .....

### Officer, I'm too drunk to drive

A Vermont police officer has described being flagged down by a motorist on a quiet road. "He pulled up behind me, rolled down the passenger side window and said he was looking for a police officer to arrest him", Ian McCollin, chief of police in Vernon, Vermont, said. "When I asked him why, he replied 'I'm drunk'". Since drivers rarely pull over police cruisers, a cautious McCollin called a colleague for backup with an amused "You won't believe this one". I also wanted him to hear the story too he said. "I was afraid they'd think I was senile or losing my mind". McCollin described him as being "very cooperative and polite, unlike your average drunk driver". Less amusing was the fact that the drunk driver was four times over the legal limit and operating on a suspended licence that had been taken away after a previous drink driving charge (from *Sydney Morning Herald*, August 2004; submitted by Ian Scott).

### Rugby ban for boy aged 11

An 11 year old rugby player has been banned for a year in New Zealand and ordered to take anger management classes after punching an adult referee in a club match. The unnamed player appeared before the Northland Rugby Union's judicial committee at Whangarei on New Zealand's North Island today to answer the striking charge from last Saturday's match. The committee had the power to ban the boy for life but settled on a one year suspension with additional conditions. The player will receive anger management counselling and will be given a "referee buddy" to gain a greater understanding of rugby rules. The committee heard the player attacked the referee after being ordered off in a junior match on Saturday. He had run toward the referee and attempted to punch and kick him, but was restrained and led from the field by team officials (from Associated Press; submitted by Ian Scott).