



V i r g i n i a C o m m o n w e a l t h U n i v e r s i t y

Motorcycle Crash / Helmet Use Study Volume 2

Special Report #13

January 2000

ABSTRACT

This Special Report focuses on motorcycle safety and related crashes occurring in Virginia. The crash data emphasizes the benefits of motorcyclists wearing approved protective helmets and the obvious hazards of wearing unsafe helmets or wearing none at all. Seven serious crashes involving ten motorcycles are examined in depth and the circumstances surrounding each one are featured. Additionally, five motorcycle riders received fatal injuries and eight riders received varying degrees of injuries in these seven case studies.

The purpose of this report is to enhance motorcycle safety by documenting the results of crashes where headgear (or lack of headgear) was related to crash outcome. This report demonstrates that when motorcycle operators wear unapproved helmets, or no helmet at all, their chances of sustaining fatal head injuries are greater than when they are involved in similar crashes wearing approved protective helmets.

The report also points out the vulnerability of motorcycle riders to serious injuries if they are involved in a crash and the importance of all motor vehicle operators being vigilant to the rider's task.

TABLE OF CONTENTS

[INTRODUCTION](#)

[VIRGINIA'S MOTORCYCLE HELMET USE LAW](#)

[CASE STUDY 1: Two Motorcycles, Rear end collision](#)

[CASE STUDY 2: Two Motorcycles, Loss of control/collision](#)

[CASE STUDY 3: One Motorcycle, Fixed object/run off road](#)

[CASE STUDY 4: Two Motorcycles, Left turning truck/angle collision](#)

[CASE STUDY 5: One Motorcycle, Left turning car/head on collision](#)

[CASE STUDY 6: One Motorcycle, Left turning car/angle collision](#)

[CASE STUDY 7: One Motorcycle, Loss of control/non-collision](#)

[APPENDIX](#)

VIRGINIA COMMONWEALTH UNIVERSITY
TRANSPORTATION SAFETY TRAINING CENTER - CRASH INVESTIGATION TEAM
Special Report, January 2000

INTRODUCTION

The Commonwealth of Virginia over the past 15 years has averaged annually nearly 48 motorcycle deaths and 1,450 injuries occurring on our highways. The single worst year for motorcycle deaths and injuries ever reported in the Commonwealth was 1985 when 96 fatalities and 2,900 injuries were

reported. Motorcycle deaths are disproportionate as related to their use when compared to other forms of motor vehicle transportation. In 1998, Virginia motorcycle registrations numbered about 66,000 or nearly 2% of all motor vehicle registrations. Motorcycles are represented in less than 1% of all motor vehicles involved in crashes and involved 1.2% of total highway injuries. Yet in fatal crashes and fatalities, motorcyclists make up 4% of highway losses. Between 1995-97, the number of motorcycle deaths per 1,000 reported crashes averaged nearly 31, or 6 times higher than fatalities from other motor vehicles.

Motorcycles by design are less stable and less conspicuous than other larger vehicles. Because their riders lack the protection of an enclosed vehicle, motorcycles are less "forgiving" than other vehicles. Therefore, their riders are more likely to be injured or killed in a mishap. According to the Insurance Institute for Highway Safety, the number of deaths on motorcycles per mile traveled is about 15 times the number in cars. National statistics indicate that for the last 15 years, motorcycle deaths have averaged over 3,100 and the highest loss on record was in 1980 when nearly 5,000 deaths were reported.

According to 1998 figures from the National Highway Traffic Safety Administration (NHTSA), protective helmets are about 29% effective in preventing motorcycle deaths and about 67% effective in preventing brain injuries. An unhelmeted rider is 40% more likely to suffer a fatal head injury, compared with a helmeted rider. Helmeted riders have up to a 73% lower fatality rate than unhelmeted riders and are 85% less likely to incur severe, serious and critical injuries than unhelmeted riders. Unhelmeted riders who are injured in motorcycle crashes also incur significantly longer hospital stays and higher medical expenses than do helmeted riders, primarily because of brain injuries. In a 1996 report to Congress, NHTSA revealed that on the average, approximately \$15,000 in inpatient costs would be saved during the first 12 months for every injured motorcyclist not sustaining a brain injury. Therefore, if all injured motorcycle riders wore helmets, fewer victims would incur the high cost of inpatient care associated with brain injury. The same study showed that public sources such as Medicaid and Medicare were tapped to pay for 23% of these medical costs.

Wearing approved, protective helmets is the single most proactive safety factor that can increase the survivability of motorcyclists. An effective method to promote motorcycle helmet use is the enactment and enforcement of helmet use laws, combined with adequate public education/information campaigns. Virginia adopted its motorcycle helmet use law in 1970. And, in 1985, the Virginia Rider Training Program (VRTP) began. The program partners with 13 Virginia Community Colleges, Albermarle County Schools and the Motorcycle Safety League of Virginia to provide novice and advanced motorcycle rider courses throughout Virginia. Through its 15 permanent sites and one mobile unit, VRTP trains 5000 students per year in both of its courses.

Data clearly indicate that helmet use laws encourage more motorcyclists to wear their helmets. In states that require all riders to wear helmets, use approaches 100% compared with about 50% in other states. Yet about only half of the states mandate helmet use by all riders. Death rates from head injuries have been shown to be twice as high among cyclists in states with no helmet laws or laws that apply only to young riders, compared with states where laws apply to all riders. Repealing or weakening helmet laws so they don't apply to all riders has been followed in a number of states by increases in deaths and injuries. In contrast, benefits return when helmet laws applying to all riders are reinstated.

In a survey conducted by the Virginia Transportation Research Council in 1998, helmet use was observed in 99.6% of the riders at their study locations. It is unknown, however, how many of those riders were wearing approved helmet versus novelty helmets. Approved helmets are designed to be more substantial by providing hard outer shells, thick protective cushioning, and strong retention straps. They must meet or exceed the standards and specifications of the Snell Memorial Foundation, the American National Standards Institute, Inc. or the U.S. Department of Transportation (DOT) to be approved and legal in Virginia.

Novelty helmets are those that, for the most part, look similar to approved helmets. However, some must be more closely examined to determine the reason for noncompliance with appropriate standards

and specifications. Novelty helmets vary in design, thickness and protective cushioning and are not as safe as approved helmets. When involved in a mishap, they provide their wearer with little or no protection and, because of poor retention straps, they often come off during crash situations.

Upon purchase, an approved helmet will display a DOT exterior sticker and an interior manufacturer's label. Novelty helmets will not display a DOT sticker at the time of purchase. Counterfeit DOT stickers have been applied to novelty helmets by their owners to give the impression they are approved helmets. Several of the case studies and photographs contained in this report illustrate the effects on their wearers of novelty helmets and approved helmets.

As a means to help educate and inform the readers of this Special Report, the Appendix contains 36 significant facts/tips that have been gathered from different sources about motorcycle safety in general and motorcycle crash data/helmet use in particular.



A sample of three commonly used motorcycle helmets showing their different design styles. The one on the left is a 3/4 helmet, the center a half helmet and on the right a German military novelty helmet.



The same three helmets showing a rearview. The novelty helmet on the right -which costs more than the helmet on the extreme left- is the only one of the three that is not an approved protective helmet. Therefore, its sale and use as a protective helmet is illegal in Virginia.



An interior view showing the proper padding and protective cushioning of the two approved helmets shown above. The novelty helmet has no protective padding, just a cloth and foam comfort liner.



An example of a full-face style helmet with its visor in use. This is an approved helmet and is manufactured with a hard outer shell, thick impact absorbing system, a thick interior padding and comfort liner and a substantial retention strap and buckle system. This style of helmet offers the most protection in the event of a mishap for its wearer.

VIRGINIA'S MOTORCYCLE HELMET USE LAW

§ 46.2-910

Motorcyclist to wear helmets, etc.; certain sales prohibited; penalty

1. Every person operating a motorcycle shall wear a face shield, safety glasses or goggles, or have his motorcycle equipped with safety glass or a windshield at all times while operating the vehicle, and operators and any passengers thereon shall wear protective helmets. Operators and passengers riding on motorcycles with wheels of eight inches or less in diameter or in three-wheeled motorcycles which have non-removable roofs, windshields and enclosed bodies shall not be required to wear protective helmets. The windshields, face shields, glasses or goggles, and protective helmets required by this section shall meet or exceed the standards and specifications of the Snell Memorial Foundation, the American National Standards Institute, Inc., or the federal Department of Transportation. Failure to wear a face shield, safety glasses or goggles, or protective helmets shall not constitute negligence per se in any civil proceeding. The provisions of this section requiring the wearing of protective helmets shall not apply to operators of or passengers on motorcycles being operated (i) as part of an organized parade authorized by the Department of Transportation or the locality in which the parade is being conducted and escorted, accompanied, or participated in by law-enforcement officers of the jurisdiction wherein the parade is held and (ii) at speeds of no more than fifteen miles per hour.
No motorcycle operator shall use any face shield, safety glasses or goggles, or have his motorcycle equipped with safety glass or a windshield unless a type either (i) approved by the Superintendent prior to July 1, 1996, or (ii) that meets or exceeds the standards and specifications of the Snell Memorial Foundation, the American National Standards Institute, Inc., or the federal DOT and is marked in accordance with such standards.

2. It shall be unlawful to sell or offer for sale, for highway use in Virginia, any protective helmet that fails to meet or exceed any standard as provided in the foregoing provisions of this section. Any violation of this subsection shall constitute a Class 4 misdemeanor.

[CASE STUDY 1: Two Motorcycles, Rear end collision](#)
[CASE STUDY 2: Two Motorcycles, Loss of control/collision](#)
[CASE STUDY 3: One Motorcycle, Fixed object/run off road](#)
[CASE STUDY 4: Two Motorcycles, Left turning truck/angle collision](#)
[CASE STUDY 5: One Motorcycle, Left turning car/head on collision](#)
[CASE STUDY 6: One Motorcycle, Left turning car/angle collision](#)
[CASE STUDY 7: One Motorcycle, Loss of control/non-collision](#)
[APPENDIX](#)

 [TSTC Information](#)

