

PATTERNS OF SAFETY BELT USE AMONG DRIVERS KILLED  
IN FATAL CRASHES IN VIRGINIA

by

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## ABSTRACT

Safety belt usage or nonusage was noted for drivers fatally injured in motor vehicle accidents in Virginia during fiscal year 1974. Data were obtained from FR300 accident report forms and available corresponding medical examiner's reports, and only those drivers in whose motor vehicles safety belts had been installed and whose deaths could be directly attributed to the motor vehicle accident were included in the study. Of the 274 fatalities that were included, 34 (12.4%) were designated as users of safety belts at the time of the accident, and the remaining 240 (87.6%) were classified as nonusers. Although a somewhat greater percentage of Virginia drivers who were users of safety belts were represented among those fatally injured during FY 1974 (12.4%) than during FY 1973 (8.2%), the difference was not statistically significant. When accident related and demographic variables were examined, significant differences between users and nonusers were found for such variables as driver's sex, vehicle age, time of day, day of the week, road condition, driver actions, and whether the driver had been drinking. It was found, for example, that a greater proportion of males not using safety belts were killed than males using safety belts, and that a greater percentage of nonusers were violating a traffic law at the time of the accident. It was also found that more nonusers than users were drinking at the time of the accident.

It was hypothesized that the proportion of safety belt users among fatalities would be the same as that among the general driving population, however, this was not found to be the case. When the safety belt usage rate among fatally injured drivers (12.4%) was compared to the usage rate among the general driving population of Virginia (24.0%) and to estimates of usage rates for drivers in two other states, statistically significant ( $p < .001$ ) differences were found. When drivers killed in fatal collisions were compared to drivers involved in but not killed in fatal collisions, the safety belt usage rate was found to be significantly lower among the fatally injured drivers. Thus, it was concluded that safety belt users were underrepresented among Virginia fatalities, and that safety belt utilization was one of the safeguards against fatal injuries among Virginia drivers during fiscal year 1974.

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BACKGROUND

Previous studies have indicated that the use of safety belts greatly reduces the probability of death or injury from motor vehicle accidents.<sup>(1, 2, 3)</sup> While a very favorable attitude toward safety belts has been expressed by users and nonusers alike,<sup>(4)</sup> and the installation of safety restraints in motor vehicles has now become mandatory on a nationwide basis, it has been estimated that "less than 30% of drivers who have belts available actually use them."<sup>(2)</sup>

As pointed out in the report on a study of the use of seat belts among drivers killed in fatal crashes in Virginia in fiscal year 1973,<sup>(5)</sup> the subject of the use of safety restraints continues to be a controversial issue revolving around three main questions. First, the legality of the requirement of mandatory use of safety belts is questioned. Lynn and Simpson have noted that this questioning is largely concerned with the issues of due process, equal protection, and the right to privacy, issues that have been dealt with by W. A. Ames in a report entitled "The Constitutionality of Mandatory Seat Belt Use Legislation."<sup>(6)</sup> Another question is whether or not legislation can increase safety belt usage. Case histories have shown a 25%-75% increase in the usage of safety restraints in the states of Victoria and New South Wales since mandatory seat belt legislation went into effect in Australia in 1972.<sup>(7)</sup> In America, a mandatory safety belt usage law among interstate commercial carriers became effective in July 1971, and studies have since placed belt usage at 93.5%.<sup>(8)</sup> The third point questions whether an increase in belt usage will actually result in a decrease in the number of fatalities and serious injuries in motor vehicle accidents. Again, Australia is cited as an example, with Victoria and New South Wales reporting substantial decreases in fatalities and serious injuries after enactment of mandatory safety belt legislation.<sup>(7)</sup>

While mandatory safety belt legislation seems to be working well in countries such as Australia, the mandatory use of safety belts is not widespread and there is a lack of conclusive data on this subject. Current efforts in this area of investigation tend to concentrate mainly on the effectiveness of safety belt usage in decreasing the number of fatalities and serious injuries resulting from motor vehicle accidents. Accordingly, it was believed to be profitable to investigate patterns of safety belt use and factors which may distinguish users from nonusers.

## PURPOSE

The purpose of the present study was to examine data concerning the use of safety belts by drivers killed in fatal accidents to determine the representation of belt usage and other demographic variables among Virginia fatalities during fiscal year 1974.

## METHODOLOGY

FR300 accident report forms and available corresponding medical examiner's reports for drivers killed in fatal crashes in Virginia between July 1, 1973, and June 30, 1974, were reviewed. Data were examined for only those drivers in whose motor vehicles safety belts had been installed, for whom safety belt use or nonuse could be determined, and whose deaths could be directly attributed to the motor vehicle accident. Safety belt usage or nonusage was noted for 274 qualifying cases, and the resulting figures were compared to usage rates among general populations of Virginia, North Carolina, and Ohio. (Due to the format of the accident report form, no distinction could be made between lap belt users or lap and shoulder belt users.) Comparisons were also made between these figures and those used in the Virginia fiscal year 1973 seat belt study. An additional comparison was made between drivers killed in fatal collisions and drivers involved in fatal collisions who were not killed. For those drivers who were killed in collision-type accidents,\* safety belt usage or nonusage was noted, and safety belt usage or nonusage was also noted for the driver(s) of the other vehicle(s) involved. The two groups were compared on the basis of representation of belt use.

Qualifying fatalities were divided into two groups, users and nonusers of safety belts, and were compared on 26 accident related and demographic variables. These variables included the driver's age, sex, race, years of driving experience, defects attributed to the vehicle, day of the week, time of day, number of vehicles involved in the crash, age of vehicle, light condition, road surface, surface condition, road condition (i.e., loose material, holes, ruts, bumps, soft or low shoulder, whether or not the road was under repair at the time of the accident, or no defects), the actions and defects attributed to the driver (including whether he had been drinking), estimated speed at the time of the accident, weather conditions, type of locality, alignment of surface, speed limits, traffic control, number of persons injured (excluding the driver), number of persons killed (excluding the driver), and visibility conditions.

## ANALYSIS

There were 274 qualifying fatalities during the 12-month period for which data were examined. Of these, 34 were wearing safety belts and 240 were not. Thus, among those fatally injured, 87.6% were nonusers of safety belts at the time of the accident. From the monthly figures in Table 1, it may be seen that between 76% and 100% of the drivers killed were not using safety belts.

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\*A collision or collision-type accident refers to an accident involving two or more motor vehicles with drivers.

Table 1  
 Safety Belt Usage Among Fatally Injured Drivers by Month

Month	Number of Fatalities	Users of Safety Belts		Nonusers of Safety Belts	
		Number	%	Number	%
July 1973	32	5	15.6	27	84.4
August	25	6	24.0	19	76.0
September	33	4	12.1	29	87.9
October	17	1	5.9	16	94.1
November	32	6	18.8	26	81.2
December	25	1	4.0	24	96.0
January 1974	22	3	13.6	19	86.4
February	20	3	15.0	17	85.0
March	27	3	11.1	24	88.9
April	16	0	0.0	16	100.0
May	19	1	5.3	18	94.7
June	6	1	16.7	5	83.3
Total	274	34	12.4	240	87.6

Although a somewhat greater percentage of Virginia drivers who were users of safety belts were represented among those fatally injured during FY1974 than during FY1973, the difference was not statistically significant (see Table 2). The figures obtained in the FY1974 study are also supported by studies conducted among all fatally injured drivers in Ohio, among all interstate carriers operating in the United States, and among fatally injured drivers in Kansas City, Missouri. A 1972 Ohio study revealed that 93.5% of all Ohio fatalities were not using safety belts at the time of the accident.<sup>(9)</sup> Also, during the first nine months of 1973, approximately 92% of those fatally injured in Ohio were not belted.<sup>(10)</sup>

Mandatory safety belt legislation for interstate commercial vehicles became effective on July 1, 1971. There was a total of 17,369 accidents involving interstate carriers during the first seven months of 1973, with 20% involving drivers who were not wearing safety belts and 80% involving drivers who were users of safety belts (see Table 3). There were 113 fatalities among accidents involving nonusers, and, among users, there were 108 fatalities. Thus, among safety belt users in interstate commercial traffic, 0.8% of the accidents resulted in a fatality, while among nonusers 3.3% of the accidents resulted in a fatality. It may be noted that while nonusers accounted for only 20% of the accidents, they were responsible for 51.2% of the fatalities.<sup>(8)</sup> Thus, nonusers among interstate carriers were significantly overrepresented among fatalities.

Table 2

## Safety Belt Usage Among Selected Groups of Fatally Injured Drivers

Group	Number of Cases	Users of Safety Belts		Nonusers of Safety Belts	
		Number	%	Number	%
Fatally injured drivers in Virginia -- FY 1974	274	34	12.4	240	87.6
Fatally injured drivers in Virginia -- FY 1973 <sup>(5)</sup>	317	26	8.2	291	91.8
Fatally injured drivers in Ohio -- 1972 <sup>(9)</sup>	1,202	78	6.5	1,124	93.5
Fatally injured drivers in Ohio -- Jan.-Sept. 1973 <sup>(10)</sup>	1,734	139	8.0	1,595	92.0
Fatally injured drivers in Kansas City, Missouri -- 1972 <sup>(14)</sup>	27	2	7.4	25	92.6

Table 3

## Safety Belt Usage Among Interstate Carriers January -- July, 1973

Statistic	Number of Cases	Users of Safety Belts		Nonusers of Safety Belts	
		Number	%	Number	%
Fatalities among interstate carriers -- Jan.-July, 1973 <sup>(8)</sup>	221	108	48.8	113	51.2
Accidents among interstate carriers -- Jan.-July, 1973 <sup>(8)</sup>	17,369	13,959	80.0	3,410	20.0
Percentage of accidents resulting in a fatality among interstate carriers	1.2	--	0.8	--	3.3

In the Virginia FY 1973 study it was suggested that all nonusers, not just those driving interstate carriers, were overrepresented among fatalities. The present study examined this hypothesis by comparing the data on belt usage among Virginia fatalities to the recorded usage among the population at risk (i. e., living Virginia drivers). A figure which represented the usage among the general driving population of Virginia was obtained by sampling 3,440 drivers in four urban and semi-urban areas of the state. Safety belt usage was found to be 24.0% among this driving population in Virginia in 1974. (11) It was expected that if the usage of safety belts did not affect the incidence of fatalities, then usage rates among fatalities and the general driving population would be approximately the same. Statistically less safety belt usage was found within the fatally injured group, and, when figures for FY 1974 were compared to this population at risk, significantly less safety belt usage was also found. The difference was found to be significant at the .001 level (see Table 4), which indicated that belt users were underrepresented among fatalities in FY 1974 and that safety belts may be instrumental in protecting drivers against fatal injury.

This hypothesis was further substantiated by estimates of out-of-state usage rates (see Table 4). The first estimate of a general driving population was obtained from a study of safety belt usage among rural North Carolina drivers during 1968. (12) Usage was placed at 32.9% for the general population which included North Carolina drivers and their passengers riding in automobiles in which safety belts had been installed. The second estimate was obtained from a study of 25,000 observations of drivers in Ohio during 1973 and usage of the population at large was estimated at 28.0%. (13) An additional estimate was obtained from a nighttime roadside survey which was conducted in Kansas City, Missouri, from October 12 to November 4, 1972. Use of safety restraints at night was observed and usage was placed at 15.2%. (14) In the first two cases, the North Carolina and Ohio studies, differences between the two estimates of general usage were found to be significant at the .001 level. Thus, the difference in safety belt usage rates between the general driving populations of North Carolina in 1968 and Ohio in 1973, when compared with that among drivers fatally injured in Virginia in fiscal year 1974, was quite significant. It may be noted that this difference is much greater than one would expect by chance, which indicates that the finding that users of safety belts are underrepresented among fatally injured drivers in Virginia is supported by studies of safety belt usage among fatally injured drivers in other states.

When drivers killed in fatal collisions were compared to drivers involved in but not killed in fatal collisions, safety belt usage was found to significantly differ for the two groups. Two analyses were made. First, data for drivers involved in fatal collisions (without regard to type of motor vehicle involved, with the exclusion of motorcycles) were examined. As shown in Table 5, significantly more nonusers of safety belts were represented among the fatalities than among those drivers not killed ( $p < .01$ ). Since the first analysis was made without regard to size of vehicles involved (for instance, in the case of a collision between a Volkswagen sedan and a tractor-trailer it would be difficult, if not impossible, to determine the effectiveness of safety belts), a second analysis was made using data for passenger vehicles only, vehicles relatively comparable in size and weight. As may be seen in Table 5, a greater number of safety belt users were represented among drivers not killed. Although this finding approached ( $p < .07$ ) but did not reach statistical significance, the trend is similar to that of the first analysis.

Table 4

Safety Belt Usage Among Fatally Injured Drivers As Compared to  
Estimates of Usage Among the Population at Risk

Statistic	Number of Cases	Users of Safety Belts		Nonusers of Safety Belts		Chi-Square
		Number	%	Number	%	
Fatally injured drivers in Virginia — FY 1974	274	34	12.4	240	87.6	
Population at risk Virginia — 1974 <sup>(11)</sup>	3,440	827	24.0	2,613	76.0	19.28*
Population at risk North Carolina — (1968) <sup>(12)</sup>	481	158	32.9	323	67.1	38.46*
Population at risk Ohio — (1973) <sup>(13)</sup>	25,000	7,000	28.0	18,000	72.0	32.80*
Population at risk Kanas City, Missouri Oct. - Nov. 1972 <sup>(14)</sup>	566	86.0	15.2	480	84.8	1.17

\* p &lt; .001

Table 5

Safety Belt Usage Among Drivers Involved in Fatal Crashes  
In Virginia in Fiscal Year 1974

Vehicle - Driver Category	Users of Safety Belts		Nonusers of Safety Belts		Chi-Square
	Number	%	Number	%	
All Motor Vehicles					
Fatally Injured	21	15.8	112	84.2	
Not Fatally Injured	37	28.5	93	71.5	6.14*
Passenger Vehicles Only					
Fatally Injured	11	15.1	62	84.9	
Not Fatally Injured	20	27.0	54	73.0	3.16

\* p &lt; .01

The 274 qualifying fatalities for FY 1974 were divided into two groups, users and nonusers of safety belts, and were compared on several accident related and demographic variables. Twenty-six variables on the FR300 accident report form were examined to determine if any additional variables could account for the difference in usage between the two groups. It was found that users and nonusers significantly differed on such variables as driver's sex, day of week, age of vehicle, road condition, actions of driver, time of day, and condition of driver (whether or not he had been drinking). It may be seen in Table 6, for example, that a greater number of males who were nonusers of seat belts were killed than males who were users of safety belts. It was also found that a greater percentage of nonusers than users were violating a traffic law at the time of the accident, and more nonusers than users were drinking at the time of or prior to the accident. These findings are significant at the .01 level.

Table 6

Characteristics of Drivers Killed in Crashes In Virginia in  
Fiscal Year 1974

Characteristic	Users of Safety Belts		Nonusers of Safety Belts	
	Number	%	Number	%
Sex				
Male	22	65	200	83
Female	12	35	40	17
Actions of Driver				
Violations	21	62	209	85
No Violations	13	38	37	15
Condition of Driver (Police Report)				
Drinking	5	17	81	44
Not Drinking	25	83	104	56
Condition of Driver (Police and Medical Report)				
Drinking	4	11	96	47
Not Drinking	31	89	108	53

Users and nonusers of safety restraints were found to differ significantly on several additional accident related variables. It was also found, for instance, that more nonusers than users were killed on weekends, more nonusers than users were killed in vehicles six years old or older, and more nonusers than users were killed on defective roads. Time of day was also found to be an important factor, with the greatest number of nonusers being killed between 6:00 p.m. and 11:59 p.m. and the greatest number of users being killed between 6:00 a.m. and 11:59 a.m. Although Lynn and Simpson found no such differences

in the FY 1973 seat belt study, these results are supported by previous studies which found differences between users and nonusers on such variables as driver's race, age, sex, the speed at which the accident occurred, the number of vehicles involved, the age of the vehicle, and whether the driver had been drinking. (12, 15, 16) Variables which were not found to be statistically significant, but approached significance ( $p < .06$ ), included light condition and estimated speed at the time of the accident. The findings indicated that more users than nonusers were killed during daylight (as opposed to during darkness, dawn, or dusk), and nonusers were traveling at faster speeds than users.

#### SUMMARY OF FINDINGS AND CONCLUSIONS

1. Of the 274 fatalities examined for fiscal year 1974, only 12.4% were found to have been wearing safety belts at the time of the accident while 87.6% were not. Although the percentage of safety belt users among drivers fatally injured in Virginia during fiscal year 1974 was somewhat greater than that found for fiscal year 1973 (8.2%), this difference was not found to be statistically significant.
2. Safety belt users and nonusers were compared on 26 accident related and demographic variables. Significant differences were found for such variables as the driver's sex, day of week, time of day, age of the vehicle, road condition (i.e., loose material, holes, ruts, bumps, soft or low shoulder, whether or not the road was under repair at the time of the accident, or no defects), and the actions and condition of the driver (i.e., whether or not he had been drinking). It was found that (a) a greater number of males who were nonusers of safety belts were killed than males who were users of safety belts; (b) more nonusers than users were killed on weekends; (c) the greatest number of nonusers were killed between 6:00 p.m. and 11:59 p.m. and the greatest number of users were killed between 6:00 a.m. and 11:59 a.m.; (d) more nonusers than users were killed in vehicles six years old or older; (e) more nonusers than users were killed on defective roads; (f) a greater percentage of nonusers than users were violating a traffic law at the time of the accident; and (g) more nonusers than users were drinking at the time of the accident.
3. Users of safety belts were underrepresented among those killed in fatal crashes in Virginia during fiscal year 1974. When the number of users was compared to estimates of usage among general driving populations of North Carolina, Ohio, and Virginia, the differences were found to be statistically significant. When drivers killed in fatal collisions were compared to drivers involved in but not killed in fatal collisions, safety belt users were found to be significantly underrepresented among fatalities. It was concluded that since users of safety belts were underrepresented among fatalities, utilization of safety belts proved to be a considerable safeguard against fatal injuries among Virginia drivers during fiscal year 1974.

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