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An Observational Servey of Saety Belt and Chld Safety Seat Use in Virginia: the 1989 Update

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Abstract

The report has been prepared in response to a request from the Transportation Safety Administration of the Department of Motor Vehicles for data concerning the use of safety belts and child safety seats by the occupants of vehicles bearing Virginia license plates.

In an effort to track changes in safety belt use as a result of various statutory enactments, enforcement campaigns, and public information efforts, a series of surveys were conducted. These surveys occurred over two time periods: 1974 through 1977, and 1983 through 1989. During the period ending in 1986, only the four major metropolitan areas of the state were used for data collection. From 1987 through 1989, survey sites were added in nine smaller communities. These areas are referred to as "towns," although several are legally classified as cities.

Prior to enactment of the child safety seat law in the 1982 session of the Virginia General Assembly and the occupant restraint law in the 1987 session, belt use by the affected groups (children under 4 years of age and all front seat occupants) showed small yearly increases. After the effective date of each of the statutes, there was a markedly large increase in use by both target groups. The child seat use rate has remained relatively stable over the entire 7-year postlaw period, at approximately two-thirds of those surveyed. The front seat rate peaked at nearly 63% in the first 6 months after the effective date of law and subsequently declined to about 55% ($p < .01$).

A number of other findings are presented in the report. Among these are the following: (1) belt use was highest in the northern area of the state; (2) there was little difference in use rates throughout the day; (3) a large proportion of child seats were misused in an obvious way; and (4) older adults had the highest rates of use with the exception of infants.

It was concluded that the major reason for the increase in belt use was the passage of the statutes requiring use by the two targeted groups of occupants.

Several recommendations are made to increase statewide safety belt use. These include directing public information and enforcement efforts toward residents of smaller communities and rural areas, occupants of the rear seating positions, young males, and areas of the state where large declines in use have occurred. It is also recommended that the mandatory use law be modified to apply also to rear seat occupants.

FINAL REPORT

AN OBSERVATIONAL SURVEY OF SAFETY BELT AND CHILD SAFETY SEAT USE IN VIRGINIA

The 1989 Update

Charles B. Stoke
Research Scientist

A report prepared by the Virginia Transportation Research Council
under the sponsorship of the Transportation Safety Administration
of the Department of Motor Vehicles

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EXECUTIVE SUMMARY

The results of motor vehicle safety research have shown that using automobile safety belts is easy and effective. In addition, a belief in the life-saving potential of safety belt use has been expressed by the general public, but they have been slow to increase use. Both federal and state efforts have been initiated to increase belt use by motorists.

In an effort to track changes in safety belt use by Virginia motorists as a result of various statutory enactments, enforcement campaigns, and public information efforts, a series of surveys were conducted. These surveys occurred over two time periods: 1974 through 1977, and 1983 through 1989. During the period ending in 1986, only the four major metropolitan areas of the state were used for data collection. From 1987 through 1989, survey sites were added in nine smaller communities. These areas are referred to as "towns," although several are legally classified as cities.

Prior to enactment of the child safety seat law in the 1982 session of the Virginia General Assembly and the occupant restraint law in the 1987 session, belt use by the affected groups (children under 4 years of age and all front seat occupants) showed small yearly increases. After the effective date of each of the statutes, there was a markedly large increase in use by both target groups. The child seat use rate has remained relatively stable over the entire 7-year postlaw period, at approximately two-thirds of those surveyed. The front seat rate peaked at nearly 63% in the first 6 months after the effective date of law and subsequently declined (and remained stable) to about 55%.

The data also show that there are differences in use rates according to geographic area, age of occupant, seat position in vehicle, and sex of occupant.

It was concluded that the major reason for the increase in belt use was the passage of the statutes requiring use by the two targeted groups of occupants.

Several recommendations are made to increase safety belt use. These include directing public information and enforcement efforts toward residents of smaller communities and rural areas, occupants of the rear seating positions, young males, and areas of the state where large declines in use have occurred. It is also recommended that the mandatory use law be modified to apply also to rear seat occupants.

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INTRODUCTION

Over the past decade, the results of motor vehicle safety research have shown that the use of automobile safety belts is one of the easiest and most efficient methods of preventing the deaths and injuries that result from motor vehicle crashes. Although the general public expresses acceptance of the injury-reduction and life-saving potential of safety-belts, they have been slow to change their belt-wearing habits. Because motor vehicle occupants are frequently not belt users, a number of activities have been initiated on the local, state, and national level in an attempt to bolster the use of these safety devices. These initiatives have had varying degrees of success.

In an effort to determine various characteristics of belt use and belt users and obtain data for use in the evaluation of countermeasure programs to increase use, federal and state governmental agencies have conducted a variety of surveys of belt use. The early studies used questionnaire and interview formats, and the more recent studies have used observational techniques.

Observational surveys of safety belt use in Virginia have been conducted in two series. The first series covered 1974 through 1977, and the second covered 1983 through 1989. Data were collected in February of 1974, 1975, and 1976 and in June of each of the other 8 years. The surveys were originally designed to determine whether there were fluctuations over time in the percentage of persons using seat belts and shoulder straps. The fourth survey, conducted during June 1977, was the first to include observations of the use of child restraints. After the 1977 survey, it was determined by transportation safety program management that annual updates were not necessary and that surveys would be conducted after the occurrence of events that would be expected to change the pattern of safety belt use.

The first significant event to occur after the 1977 survey was the passage of the child safety seat law (Senate Bill 413) during the 1982 session of the Virginia General Assembly. The statute went into effect January 1, 1983, and in June, observers were in the field collecting data on the use of child restraints. At the same time, data were collected on the use of safety belts by other vehicle occupants. Belt use data have been collected each summer since 1983 because efforts by various

state and private groups, members of the legislature, and the print and electronic media may have influenced user rates and patterns.

PURPOSE

This study has three purposes: (1) to determine the extent to which the law mandating the use of child safety seats has affected the use rate, (2) to determine the extent to which the law mandating the use of belts by front seat occupants has changed the use rate, and (3) to determine user (and nonuser) characteristics for use in the subsequent efforts to increase belt use.

SURVEY METHOD

In June of each year since 1983, observers surveyed vehicle occupants in the four major metropolitan areas of Virginia. Surveys were conducted for 2 days in the Roanoke-Salem area (western urban), 3 days in the Alexandria-Arlington-Fairfax County area (northern urban), 2 days in the Richmond-Henrico-Chesterfield area (central urban), and 2 days in the Norfolk-Hampton-Newport News area (eastern urban).

Three sites in different sections of the survey areas were surveyed each day. The sites were chosen because they carried a relatively high traffic volume and provided adequate and safe vantage points for the observers. On each day data were collected, both primary and secondary routes were sampled. Although the study sites did not include any interstate highways, vehicles going to and from such roadways were surveyed. The observers worked three periods of 2.5 hours each: (1) morning rush hour, (2) mid-day shopping/lunch hour, and (3) afternoon rush hour. Data were collected on each day of the week.

Data collection procedures were modified by the addition of nine small jurisdictions to the survey sites beginning with the June 1987 survey. Throughout this report, these localities are referred to as towns, even though some are actually small cities. During one week in June, 1 day was worked in Marion, Wytheville, and Galax (western town); 1 in Covington, Lexington, and Harrisonburg (valley town); and 1 in Emporia, South Boston, and Farmville (southside town). Data were collected during 2-hour periods in each community; the survey time periods were selected based on the traffic patterns and traffic volumes in the community and the time of day the major employment centers began and ended the workday. In addition, because each set of towns was dispersed over a wide geographic area, time had to be allowed for travel from one survey location to the next. The three time periods used were (1) morning rush hour, (2) mid-day shopping/lunch hour, and (3) afternoon rush hour.

The survey procedures limited the types of vehicles included in the observation sample. Only occupants riding in passenger cars with Virginia license plates

were included. State, municipal, and company vehicles were excluded because the use of safety belts by the occupants of such vehicles is generally mandated by the employer as a condition of employment.

All observations were made at signalized intersections. Usually, occupants of vehicles in the lane adjacent to the curb were surveyed, although traffic flow dictated the use of other lanes in some instances. A clipboard bearing the question "Are you wearing safety belts?" was displayed by the observer to alert travelers to the purpose of the survey. After the clipboard was presented, the observer approached the car at the front fender and walked along the side and past the vehicle recording the use of safety restraints. Often, the occupants of the vehicle would reply to the question on the clipboard, but only information verified by the observer was recorded. Persons volunteering information were acknowledged, but their comments were recorded only when their vehicle was within the guidelines specified for data collection.

At each site, the observers recorded whether the driver and all passengers were using only a lap belt, both a lap and shoulder belt, or no form of safety restraint. The survey personnel also recorded the sex and approximate age of each occupant in the vehicle. Occupant age was divided into five categories: (1) infants (up to 4 years), (2) preadults (4 to 16 years), (3) young adults (17 to 30 years), (4) middle adults (31 to 60 years), and (5) older adults (over 60 years). In addition, observers recorded whether any infants in the car were in a safety seat. In years prior to 1986, any incorrect child seat use was recorded as if the seat was not being used. For 1986 and subsequent years, child safety seat use was categorized as follows: (1) a child in the seat, and the seat correctly used (the "A" answer); (2) a child in the seat, and the seat incorrectly used (the "Z" answer); and (3) a child in the car, and the restraint not being used (the "N" answer). Figure 1 is a copy of the survey form used.

One major change was made in the survey procedures in 1987 involving the recording of the correct or incorrect use of a child safety seat. This change came about because of concerns expressed on the state and national levels that the observers from previous surveys were being too lenient in their recording of correct use. The members of the observation teams were given special instructions to make them aware of features of child seat use that should lead to the use being recorded as incorrect. A number of items were discussed, and examples were studied. In addition, sample seats were used to demonstrate various principles. Among the items that would determine use patterns were (1) the routing of the lap belt through the seat structure, (2) the orientation of the seat (whether it was facing the proper direction for the age of the occupant), (3) the use of the child seat harness (ensuring that it was clipped together and that the occupant was properly within it), (4) the presence of a locking clip and top tether strap (and the style of seat where they might be expected), and (5) the use (or nonuse) of arm bars or shields. In previous years, only the belt routing and use of arm bars/shields were closely observed.

SAFETY BELT USAGE SURVEY FORM

DATE ____________ START TIME ____________ LOCATION ____________

SHEET NO. ____________ STOP TIME ____________ AT ____________

DRIVER			MID FRONT			RIGHT FRONT			LEFT REAR			MID REAR			RIGHT REAR		
BELT	SEX	AGE	BELT	SEX	AGE	BELT	SEX	AGE	BELT	SEX	AGE	BELT	SEX	AGE	BELT	SEX	AGE
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O
L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O	L A N S Z	M F	I P Y M O

RESTRAINT USAGE:

- L - LAP BELT
- S - LAP/SHOULDER
- N - NONE
- A - CHILD SEAT CORRECTLY USED
- Z - CHILD SEAT INCORRECTLY USED

OCCUPANT AGE:

- I - INFANT (0-3 YRS.)
- P - PRE-ADULT (4-16 YRS)
- Y - YOUNG ADULT (17-30 YRS.)
- M - MIDDLE ADULT (31-60 YRS.)
- O - OLDER ADULT (61+ YRS.)

Figure 1. Survey Form.

ANALYSIS

The data in this report are discussed in three sections. In the first, data from the urban areas are analyzed. These data are a continuation of data collected at the same sites used since 1974. Only the data collected since 1985 are included in this report. This provides data for 3 years prior to the effective date of Virginia's mandatory use law (pre-MUL) applicable to front seat occupants and for the 2 years after (post-MUL). In this way, pre-MUL and post-MUL comparisons of use rates can be carried out. The second section discusses data collected in nine towns located in three different geographic areas of the state. Town data collection was added in 1987; therefore, there are no comparable figures from previous years. In the third section, the combined urban and town data are treated as statewide data. These combined data are available only for 1987, 1988, and 1989.

In carrying out this project and in preparing the report, consideration was given to the conduct of statistical tests to determine the significance of the differences in observed year-to-year safety belt use. Both the short-term and long-term objectives of this research effort are to detail changes in safety belt use resulting from the enactment of the MUL or from any subsequent changes in the statute. Because the data from 1985, 1986, and 1987 form the baseline against which the subsequent data are compared, and no program, policy, or administrative advantage would be gained by determining whether or not changes in belt use over these 3 years were statistically significant, a decision was made not to conduct statistical testing on these data. In addition, statistical tests were not carried out to determine the significance of the difference between pre-MUL and post-MUL belt use. The magnitude of the change was so great and the number of observations so large that a determination of a statistical difference would not provide any additional information that would be useful in policy or program decisions. There is, however, one area where the absence or existence of a statistical difference could affect administrative decision making as it relates to legislative proposals or research activity. This is whether safety belt use in the two post-MUL periods (1988 and 1989) were actually different. Stated another way: Was the drop in belt use between the 1988 peak and the 1989 current rate a statistically significant change? The chi square (χ^2) test of significance was carried out for selected sets of 1988 and 1989 data to determine the level of the differences found. In those instances where appropriate, the text of the report indicates where a difference existed and at what level it occurred.

Safety Belt Use in Urban Areas

At the outset, it should be noted that large percentage increases in safety belt use from year to year and over the 5 years could be the result of small numerical increases in very small survey samples. They could also be the result of a change in the actual use patterns. The reader is cautioned to view large percentage rates of change in use patterns in light of the overall percentage of use for the category under discussion.

The data in Table 1 show the rates of safety belt use by drivers and passengers. Rates of use for the occupants of each seat position are based on the number of occupants in the position. Thus, the figures in Table 1 make it appear that the use of child restraints is very low because the use rates are not restricted to those for occupants in the 0–4 age group. Subsequent tables in the report show age group use rates.

In the 3 years pre-MUL, there were yearly increases in belt use for both drivers and right front passengers (RFPs). The driver rate increased from 28.4% in 1985 to 40.4% in 1987, and the RFP rate increased from 24.7% to 35.8%. The belt use rate for remaining passengers (RPs) increased from 27.4% (1985) to 34.8% (1986), and then declined to 29.1% (1987).

In June 1988, 6 months post-MUL, belt use by drivers had reached 68.9%, but in June 1989, the driver rate had dropped to 61.0% ($p < .01$). The same trend of a major rate increase immediately post-MUL and a subsequent drop was observed for RFPs. In 1988, 59.7% of RFPs were belt users, but in 1989, only 51.6% used belts ($p < .01$). The RP use rates post-MUL followed the same trend as for the other occupant categories, but the magnitude of the variation was smaller: rising to 34.7% in 1988 and then dropping to 29.0% in 1989 ($p < .01$).

As previously stated, a new classification of data was included beginning in 1986: incorrectly used child safety seats. Because this was an in-traffic survey, members of the observation team could not enter vehicles to check for certain installation characteristics. Only those items clearly identifiable from the outside of the vehicle were checked. Even with this lenient procedure, approximately 17% of all infant RPs in 1986, 1988, and 1989 were categorized as being in an incorrectly used child safety seat. In 1987, when the safety seat classification procedure was more stringent, nearly 42% of the infant RPs were incorrectly using a child safety seat. Incorrect child seat use by RFPs was also observed. These rates varied from nearly 10% in 1986 and 1989, to 18% in 1988, to just over 31% in 1987.

Data on the association between driver and passenger uses of safety belts are shown in Table 2. There was an increase throughout the 5-year period in the percentage of RFPs using belts even when the driver did not use them. In 1985, only 7.3% of these RFPs used a safety belt, but by 1989, the rate reached 17.2%. Although a use rate under 20% is not very good, the most recent rate does represent a 5-year increase of nearly 2.4 times that in 1985 and is an indication that the child safety seat law is having some minimal effect on a group of motorists most reluctant to change.

The percentage of RPs using safety belts when the driver did not use them has fluctuated from 16.6% (1986) to 9.9% (1989). The most recent rate is lower than that in 1988 (13.2%), just after the law's effective date. It can be speculated that a law requiring front seat occupants and not rear seat occupants to buckle up may have had a negative effect on RP belt use. The most important finding from the survey data is that in 1989 nearly 83% of the RFPs and 90% of the RPs riding with unbuckled drivers also did not buckle up.

TABLE 1

Use of Safety Belts: Urban Areas

PRE-MUL							
Occupant Seat Position	Belt Used	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	Lap Only	128	2.4	156	2.5	93	1.5
	Lap/Shoulder	1,415	26.0	2,033	33.0	2,339	38.9
	None	3,893	71.6	3,966	64.4	3,588	59.6
Right Front Passenger	Lap Only	64	3.7	80	4.0	66	3.5
	Lap/Shoulder	322	18.8	524	26.5	575	30.3
	Child "A"[1]	37	2.2	37	2.2	33	2.0
	Child "Z"[2]	N/A[3]	—	4	0.2	15	0.8
	None	1,292	75.3	1,337	67.6	1,202	63.4
Remaining Passengers	Lap Only	108	11.0	224	20.3	212	19.2
	Lap/Shoulder	20	2.0	24	2.2	14	1.3
	Child "A"	142	14.4	135	12.3	95	8.6
	Child "Z"	N/A	—	27	2.4	68	6.1
	None	714	72.6	692	62.8	718	64.9

POST-MUL					
Occupant Seat Position	Belt Used	1988 Number	1988 Percent	1989 Number	1989 Percent
Driver	Lap Only	178	2.5	88	1.2
	Lap/Shoulder	4,742	66.4	4,357	59.8
	None	2,217	31.1	2,840	39.0
Right Front Passenger	Lap Only	96	4.7	29	1.4
	Lap/Shoulder	1,084	52.6	993	48.0
	Child "A"	49	2.4	46	2.2
	Child "Z"	11	0.5	5	0.2
	None	820	39.8	997	48.2
Remaining Passengers	Lap Only	171	15.1	121	11.4
	Lap/Shoulder	41	3.6	54	5.1
	Child "A"	182	16.0	133	12.5
	Child "Z"	38	3.4	27	2.5
	None	702	61.9	731	68.6

[1] Child in seat and seat correctly used.
[2] Child in seat and seat incorrectly used.
[3] N/A = data not categorized in this manner.

TABLE 2

Association Between Driver and Passenger Use of Safety Belts: Urban Areas

WHEN DRIVERS NOT USING SAFETY BELTS							
PRE-MUL							
Occupant Seat Position	Occupant Use of Belts	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Right Front Passenger	Belted	92	7.3	127	9.6	142	12.0
	Not Belted	1,176	92.7	1,199	90.4	1,046	88.0
Remaining Passengers	Belted	93	13.4	118	16.6	83	11.6
	Not Belted	600	86.6	591	83.4	632	88.4
POST-MUL							
Occupant Seat Position	Occupant Use of Belts	1988 Number	1988 Percent			1989 Number	1989 Percent
Right Front Passenger	Belted	102	15.1			148	17.2
	Not Belted	574	84.9			714	82.8
Remaining Passengers	Belted	49	13.2			47	9.9
	Not Belted	321	86.8			426	90.1
WHEN DRIVERS USING SAFETY BELTS							
PRE-MUL							
Occupant Seat Position	Occupant Use of Belts	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Right Front Passenger	Belted	331	74.0	510	77.3	536	75.8
	Not Belted	116	26.0	150	22.7	171	24.2
Remaining Passengers	Belted	177	60.8	265	67.4	238	60.7
	Not Belted	114	39.2	128	32.6	154	39.3
POST-MUL							
Occupant Seat Position	Occupant Use of Belts	1988 Number	1988 Percent			1989 Number	1989 Percent
Right Front Passenger	Belted	1,127	81.4			920	76.2
	Not Belted	257	18.6			288	23.8
Remaining Passengers	Belted	345	45.2			261	44.0
	Not Belted	419	54.8			332	56.0

A low RP use rate is cause for concern because these are the seat positions used primarily by infants and young children. Although adults might elect not to protect themselves, it should be expected that they would protect their children,

especially in light of the statute requiring the use of a child safety seat by an occupant 4 years old or younger.

The data were also categorized according to passenger use when the driver was using a safety belt system. Other than for 1988 when the use was just over 81%, there has been little variation in RFP belt use pre- and post-MUL, with the most current rate being 76.2%.

The figures for RPs were not nearly so high as those for RFPs. In the 3 years pre-MUL, belt use by RPs riding with belted drivers ranged from nearly 61% to just over 67%. In the 2 years post-MUL, belt use by RPs decreased ($p < .01$) and is now in the mid-40s. Since the Virginia MUL does not apply to rear seat occupants, there appears to be a number of persons who buckled up in the past who believe it is no longer necessary to do so.

The data in Table 2 indicate that a very large proportion of the passengers were using safety belts when the drivers were using safety belts. Conversely, when drivers were not using a belt system, a very large proportion of the passengers were not using a belt system. These data do not show whether driver use caused passenger use or whether passenger use caused driver use; they do, however, indicate that if one vehicle occupant uses a belt system there is a high probability that other occupants will also use them.

The data in Table 3 depict safety belt use according to sex. In the 3 years pre-MUL, the yearly increases in belt use by male drivers totaled nearly 10 percentage points (26.4% to 36.0%). Post-MUL, there was a 27.5 point (76%) increase in use by male drivers, to a peak use of 63.5%. In 1989, the rate dropped to 55.4%, a 13% decline. Although the rates themselves differ, belt use by female drivers followed the same pattern as that for male drivers: a gradual 3-year rise (30.6% to 44.7%) and a very large increase in use to 74.2%, followed by a decline to 66.4% in June 1989. Each year, belt use by female drivers exceeded that by male drivers by from 4 to 11 percentage points; the larger differences being observed in the past 2 years.

As with drivers, belt use by both male and female RFPs rose gradually from 1985 to 1987, increased significantly in 1988, and then declined in 1989. In 1985, belt use by male RFPs was 25.4%; the rate peaked at 51.5% in 1988 and was 42.8% in 1989. For female RFPs, the rate was 24.3% in 1985, peaked at 63.6% in 1988, and was 56.4% in 1989. These lower rates in 1989 were still higher than any rate observed pre-MUL. In the year of highest use pre-MUL (1987), just over one-third of the male and female RFPs were using safety belts. In 1989, slightly more than one-half of the male and female RFPs were belt users. Two other factors of note are that (1) male and female RFP use was lower than that for drivers, and (2) females, generally, had a higher use rate than did males, and this disparity was more than 13 percentage points (32%) in 1989.

Belt use rates for male and female RPs were less variable than those for occupants of the other seating positions. Use by male RPs varied from 27.8% in 1987 to 34.5% in 1986 (a rate similar to the 34.2% in 1988). The current male RP rate is

TABLE 3

Belt Use by Sex: Urban Areas

PRE-MUL							
Occupant Seat Position	Sex of Occupant	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	Male	752	26.4	1,064	33.1	1,071	36.0
	Female	791	30.6	1,125	38.2	1,361	44.7
Right Front Passenger	Male	143	25.4	185	29.0	212	34.4
	Female	280	24.3	452	33.8	466	36.4
Remaining Passengers	Male	143	31.8	157	34.5	147	27.8
	Female	127	23.7	226	34.9	164	28.4

POST-MUL					
Occupant Seat Position	Sex of Occupant	1988 Number	1988 Percent	1989 Number	1989 Percent
Driver	Male	2,232	63.5	1,970	55.4
	Female	2,688	74.2	2,475	66.4
Right Front Passenger	Male	343	51.5	310	42.8
	Female	886	63.6	758	56.4
Remaining Passengers	Male	185	34.2	152	30.8
	Female	209	35.2	165	28.8

30.8%. Use by female RPs varied from 23.7% in 1985 to 35.2% in 1988 (a rate similar to the 34.9% in 1986). The current female RP rate is 28.8%. Both male and female RP rates of use each year were lower than those for drivers and RFPs.

Table 4 shows safety belt use data according to age. There were few preadult drivers each year of the survey, but at least half were safety belt users except in 1986. Belt use by preadult drivers was slightly higher in 1988 and 1989 (56.0% and 66.7%) than in any year pre-MUL. Between 1985 and 1987, belt use by young adults increased from 27.6% to 42.4%. In 1988, nearly two-thirds of these drivers were using safety belts, but the rate of use had declined to 58.6% in 1989. Over the 3 years pre-MUL, belt use by middle adults rose from 29.9% (1985) to 40.4% (1987). Post-MUL, middle adult belt use was 69.7% in 1988 and 62.1% in 1989. Driver belt use by older adults increased from 21.9% in 1985 to 34.6% in 1987, rates lower than those for the other age groups. In 1988, however, older adults had the highest driver age group rate (74.3%), and although there was a larger decline in use by these drivers in 1989 than for the other age classifications, the use rate (62.1%) still equaled that for middle adults and was higher than the young adult rate.

When RFP belt use was categorized by age, there was little difference in the rate of use by infants in 1985 (76.4%) and 1986 (75.0%). There was a large drop in

TABLE 4

Belt Use by Age: Urban Areas

PRE-MUL							
Occupant Seat Position	Age of Occupant	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	Preadult	2	50.0	4	28.6	25	51.0
	Young Adult	428	27.6	626	34.6	945	42.4
	Middle Adult	989	29.9	1,227	37.2	1,159	40.4
	Older Adult	124	21.9	332	32.1	294	34.6
Right Front Passenger	Infant	42	76.4	33	75.0	37	56.9
	Preadult	92	30.0	122	39.1	160	47.1
	Young Adult	80	19.1	123	24.5	170	29.3
	Middle Adult	174	25.1	227	33.4	185	33.2
	Older Adult	35	14.6	132	30.0	126	35.8
Remaining Passengers	Infant	145	64.4	136	68.0	95	40.3
	Preadult	102	21.7	194	32.6	182	30.7
	Young Adult	5	4.5	22	17.7	14	12.0
	Middle Adult	15	11.1	24	23.3	8	10.1
	Older Adult	3	6.8	7	8.9	14	12.0

POST-MUL					
Occupant Seat Position	Age of Occupant	1988 Number	1988 Percent	1989 Number	1989 Percent
Driver	Preadult	14	56.0	16	66.7
	Young Adult	1,502	65.8	1,348	58.6
	Middle Adult	2,792	69.7	2,618	62.1
	Older Adult	612	74.3	463	62.1
Right Front Passenger	Infant	49	73.1	46	83.6
	Preadult	198	64.3	151	49.0
	Young Adult	319	54.8	281	46.2
	Middle Adult	430	58.1	414	51.6
	Older Adult	233	64.2	176	59.3
Remaining Passengers	Infant	182	64.5	138	68.3
	Preadult	167	33.9	139	25.0
	Young Adult	12	7.4	13	10.0
	Middle Adult	23	16.7	21	16.7
	Older Adult	12	7.4	13	10.0

correct use in 1987 to 56.9%, primarily as a result of changes in the observation procedures. The rate of infant use in 1988 (73.1%) was slightly lower than in 1985 and 1986. In 1989, RFP infant use had increased to 83.6%. The preadult RFP use rate was 30.0% in 1985 and 47.1% in 1987, peaked at 64.3% in 1988, and dropped to 49.0% in 1989. The 1989 preadult rate was similar to that in the period

immediately pre-MUL. Each year, belt use by young adult RFPs was lower than that for the other age classifications. In 1985, only 19.1% used a safety belt, and the rate increased to only 29.3% by 1987. Immediately post-MUL, the young adult RFP use rate was 54.8%, and 1 year later it was 46.2%. Safety belt use by middle adult RFPs was 25.1% in 1985 and, during the pre-MUL period, increased to 33.2% by 1987. In 1988, 58.1% of the middle adult RFPs were using safety belts, but the rate dropped to 51.6% in 1989. Older adult RFPs had the lowest use rate (14.6%) in 1985, but by 1987, their rate of use had increased to 35.8%, a rate higher than that for young and middle adults. In both years post-MUL, older adult RFPs had a rate of use higher than those for young and middle adult RFPs: 64.2% used a belt in 1988, and 59.3% did so in 1989. The data also show that, in most years, young, middle, and older adult RFPs had a belt use rate lower than those for drivers of the same age group.

Belt use rates by infant RPs were relatively consistent in the pre- and post-MUL periods. Only in 1987, when observation procedures for infant belt use were modified, was the rate not in the mid-to-upper-60s. In each of the other 4 years, the infant RP rate varied between 64% and 68%. This consistency of use is due to the existence of a child safety seat law since 1983. The pre-adult RP use was 21.7% in 1985 and 30.7% in 1987. The rate increased to only 33.9% in 1988 post-MUL, and then dropped to 25.0% in 1989, a rate lower than that in 1987, pre-MUL. Use rates for young, middle, and older adult RPs varied from 4.5% for young adults in 1985 to 23.3% for middle adults in 1986. For the most part, few RP use rates for these three age classifications exceeded 15%. Over the 5 years of data presented in this report, RP use rates were much lower than those for drivers and RFPs. In addition, the state's MUL does not apply to rear seat occupants, and therefore there was no sharp increase in use rates between 1987 and 1988, as seen for drivers and RFPs. The data for the three age groups over 16 years of age do provide an indication of how few of these passengers were in these seating positions on a daily basis..

Data on safety belt use by survey time period are shown in Table 5. As with other variables, the driver use rate rose during each survey time period from 1985 to 1987, increased markedly in 1988, and then declined in 1989. During any single year of the survey, driver use varied by fewer than 4 percentage points among the three time periods. In fact, in 1986, 1987, and 1989, the variation among the three periods was less than 2 percentage points. This small variance by time period indicates a stable rate of use throughout the day, and changes in the rate at any one site do not affect overall belt use rates. When the data are considered on a longitudinal basis, driver belt use during each time period in 1985 was approximately 30%; by 1987, it was nearly 40%. Post-MUL, driver belt use was almost 70% for each time period in 1988 but dropped to just over 60% in 1989.

When categorized according to survey time period, RFP belt use was also relatively stable throughout the day: the rates varied by approximately 5 points in 1985 and 1989 and approximately 3 points in 1986, 1987, and 1988. In addition, RFP rates were not so high as those for drivers in any period in which data were collected. In 1985, only about one-fourth of RFPs used safety belts; the rates increased to the low-30s in 1986 and to the mid-30s in 1987. In 1988, nearly 60% of

TABLE 5

Belt Use by Survey Time Period: Urban Areas

PRE-MUL							
Occupant Seat Position	Time Period	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	A.M.	506	30.4	703	36.5	837	39.8
	Mid.	493	27.9	688	35.6	753	41.0
	P.M.	544	27.1	798	34.8	842	40.5
Right Front Passenger	A.M.	106	27.7	152	33.4	199	35.9
	Mid.	155	25.5	218	30.7	235	37.5
	P.M.	162	22.4	267	32.9	244	34.2
Remaining Passengers	A.M.	77	39.3	86	42.4	91	29.4
	Mid.	91	25.1	132	32.0	122	29.8
	P.M.	102	24.0	165	33.9	98	25.3

POST-MUL					
Occupant Seat Position	Time Period	1988 Number	1988 Percent	1989 Number	1989 Percent
Driver	A.M.	1,648	70.6	1,429	62.3
	Mid.	1,464	67.2	1,452	60.4
	P.M.	1,808	68.8	1,564	60.4
Right Front Passenger	A.M.	294	60.7	236	49.9
	Mid.	404	58.0	397	54.8
	P.M.	531	60.3	435	49.9
Remaining Passengers	A.M.	79	35.0	67	36.0
	Mid.	161	38.7	138	31.7
	P.M.	154	31.3	112	25.2

RFPs used a safety belt, but in 1989, the rate dropped to about 50%. For the most part, the morning and afternoon rates were the same, with the mid-day rate having the most variability.

During 1985 and 1986, belt use by RPs was greater than for RFPs and nearly equal to that for drivers. In the other 3 years, belt use by RPs was lower than for both drivers and RFPs. In addition, in only one time period in 1986 did a rate exceed 40%. Rates of use generally ranged from the mid-20s to the mid-30s. Although there were slight rate increases between 1987 and 1988, the rates in 1989 were little better than those pre-MUL. The data also show that the variance in use rates throughout the day was greater for RPs than for drivers or RFPs. Because there are significantly fewer RPs than drivers and RFPs, these variances have a minimal effect on daily use rates.

The driver and RFP data for all 5 years and the RP data from 1987 and 1988 indicate that the results of observational surveys of safety belt use were not dependent on the time of day the data were collected. This is an important implication in the conduct of surveys because it permits a greater latitude in selecting observational sites in the various communities that might participate in special programs to increase the use of safety belts by their residents. Thus, it matters little what time of day the occupants are surveyed for their belt-wearing habits because, if previous patterns continue, the survey team will find the same general rate of use throughout the day.

Table 6 presents data on safety belt use according to the area of the state surveyed. In each of the four areas, there were increases in safety belt use by drivers from 1985 through 1988. In the 1985–1987 period, driver use was highest in the northern area and lowest in the western area, and there was considerable variation in the rates each year and over the 3-year period. In 1988, driver belt use was highest in the central area and varied by only 3 points in the other three areas. In 1989, although use rates were not so high as in 1988, driver use of safety belts varied by less than 1 point in the northern, central, and eastern areas, and the rate in each of these three areas was higher than that in the western area.

In 1988, belt use by drivers peaked at 65.4% in the western area, 68.4% in the northern area, 74.0% in the central area, and 68.0% in the eastern area. The current (1989) rates are in the low-60s in the northern, central, and eastern areas and in the mid-50s in the western area. Although lower than the area rates immediately post-MUL, these rates still represent an improvement in belt use from that observed pre-MUL.

For the 3 years pre-MUL and the 2 years post-MUL, safety belt use by RFPs was lower than for drivers all 5 years in each survey area. Although RFP rates were lower, the use patterns were the same: a small increase in each of the first 3 years, a large increase in 1988, and a drop in 1989. From 1985 through 1987, there were only two instances where the rate of RFP use exceeded 40%, and both times it was in the northern area. Other area rates during this period ranged from the high teens to the mid-30s. There was as much as a 20-point spread in use between areas during a single year (1986) and by as many as 13 points in a single area (northern) over the period. In 1988, variability between areas had narrowed considerably, with the range of differences being just over 5 percentage points. The peak rates for RFPs were 57.0% in the western area, 60.8% in the northern area, 62.2% in the central area, and 58.7% in the eastern area. In 1989, use rates were lower than those in 1988 but were higher than the rates pre-MUL. Variability also increased to over 8 points in 1989. Other than in the western area with a rate just shy of 46%, the rates in the other three areas were in the low-50s: 52.9% in the northern area, 51.5% in the central area, and 54.3% in the eastern area.

RP use rates were higher than for RFPs in 1985 and 1986 and lower in 1987, 1988, and 1989. Over the 3 pre-MUL years and 2 post-MUL years, no RP use rate exceeded 40%. During the 1985–1987 period, RP use ranged from the mid-20s to the mid-30s. In 1988, the peak belt use year, use rates were 29.1% in the eastern

TABLE 6

Belt Use by Area of the State Surveyed: Urban Areas

PRE-MUL							
Occupant Seat Position	Survey Area	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	Western	286	24.3	375	26.7	405	29.1
	Northern	597	33.8	960	47.1	1,052	50.7
	Central	334	24.7	403	29.2	509	38.1
	Eastern	326	28.5	451	33.9	466	38.3
Right Front Passenger	Western	70	19.0	111	24.3	120	27.6
	Northern	163	31.2	273	43.8	292	44.2
	Central	79	21.9	87	23.7	105	30.8
	Eastern	111	24.0	166	31.3	161	35.1
Remaining Passengers	Western	50	24.3	84	33.5	71	26.8
	Northern	91	31.3	132	36.8	118	30.3
	Central	48	26.5	63	33.5	62	30.1
	Eastern	31	26.5	104	34.2	60	24.3

POST-MUL					
Occupant Seat Position	Survey Area	1988 Number	1988 Percent	1989 Number	1989 Percent
Driver	Western	1,004	65.4	834	54.8
	Northern	1,603	68.4	1,527	63.1
	Central	1,204	74.0	1,070	62.3
	Eastern	1,109	68.0	1,014	62.4
Right Front Passenger	Western	240	57.0	195	45.9
	Northern	396	60.8	373	52.9
	Central	234	62.2	191	51.5
	Eastern	359	58.7	309	54.3
Remaining Passengers	Western	77	36.8	43	22.3
	Northern	136	38.3	136	35.0
	Central	74	36.6	43	23.8
	Eastern	107	29.1	95	29.8

area, 36.6% in the central area, 36.8% in the western area, and 38.3% in the northern area.

When RP use rates were considered on a longitudinal basis, there were increases in the rates between 1985 and 1986, drops in 1987, rises to a peak use in 1988, and another drop in 1989. The 1989 RP use rates in the western (22.3%) and central (23.8%) areas were lower than pre-MUL rates. The 1989 RP use rates in the northern (35.0%) and eastern (29.8%) areas were higher than pre-MUL rates.

Safety belt use data collected in the four major metropolitan areas of Virginia can be summarized as follows:

1. In the 3 years pre-MUL, there were gradual rises in belt use by drivers and RFPs.
2. Six months post-MUL, there was a marked increase in belt use by drivers and RFPs.
3. Eighteen months post-MUL, driver and RFP belt use had declined ($p < .01$), but the rates were higher than pre-MUL.
4. Belt use by RPs was lower post-MUL ($p < .01$) than pre-MUL.
5. There was a positive association between driver and passenger use of safety belts; if one occupant used a safety belt, there was a high probability that the other occupants would also use one.
6. A greater percentage of female drivers and passengers used safety belts than did male drivers and passengers.
7. In 1989, young adult drivers and RFPs had the lowest use rates by age.
8. In both the pre- and post-MUL periods, there was little difference in the belt use rates by the hour of the day the survey was conducted.
9. In general, belt use by drivers and passengers was highest in the northern area and lowest in the western area of the state.

Safety Belt Use in Towns

In 1987, data collection was initiated in communities other than the major metropolitan centers of Virginia. Every town (and most of the smaller cities) in the state was considered for inclusion in the sample (the term *town* is used to refer to all of these localities). Time, travel limitations, and costs prevented the collection of data in each of them. Several were eliminated because it was known that they were part of special community programs to raise the belt use of their residents, and this would bias the results of observed baseline use. Others were eliminated because of other characteristics, such as the absence of traffic signals where observers could stand to collect data in accordance with previously established procedures or because of their distance from the next closest town (travel time in excess of 2 hours between sites eliminated some towns from consideration). Once this disqualification process was accomplished, the investigator visited the following 30 towns and observed the traffic flow at every signalized intersection in each:

1. Bluefield
2. Tazewell
3. Marion
4. Wytheville
5. Hillsville
6. Galax
7. Blacksburg
8. Christiansburg
9. Chatham
10. Gretna
11. Altavista
12. Amherst
13. Buena Vista
14. Lexington
15. Clifton Forge
16. Covington
17. Waynesboro
18. Staunton
19. Harrisonburg
20. Strasburg
21. Front Royal
22. Warrenton
23. Culpeper
24. Ashland
25. Emporia
26. South Hill
27. Clarksville
28. South Boston
29. Keysville
30. Farmville

In addition, tables published by the VDOT that listed the vehicle traffic counts for the major thoroughfares approaching each town were reviewed. Several of these towns had very little traffic during the survey hours, and others lacked a safe site for data collection. Nine towns in three different geographic regions of the state were chosen to be included in the survey sample. In reality, there were only a few other towns that could also have been included. The survey hours were 7 a.m. to 9 a.m., 11 a.m. to 1 p.m., and 4 p.m. to 6 p.m.—hours of observation similar to but not identical with those in the urban areas. These hours were selected because of the special travel circumstances in these areas.

The data in Table 7 show the rates of safety belt use by the three classifications of occupants. These use rates are based on the number of occupants using safety belt systems as a function of all occupants in that seat position. Driver belt use was 20.2% 6 months pre-MUL, increased to 55.8% 6 months post-MUL, and declined to 49.1% ($p < .01$) another 12 months later. RFP belt use was 18.2% in 1987, peaked at 48.0% in 1988, and dropped to 41.2% ($p < .01$) in 1989. Safety belt use by RPs did not follow the rise and fall trend in use found for drivers and RFPs. RP use declined from 22.8% in 1987 to 18.5% in 1988. There was an increase that was not statistically significant to 19.1% in 1989. These data show that safety belt use was higher for front seat occupants (those to whom the MUL applies) and lower for rear seat occupants.

The association between driver and passenger use of safety belts is shown by the data in Table 8. In 1987 (pre-MUL), when the driver was *not* using a safety belt, only 4.3% of RFPs and 9.2% of RPs were using their safety belt. In 1988, the first year post-MUL, when the driver was not using a safety belt, belt use by RFPs was 15.8% and that by RPs was 5.1%. In the second year post-MUL, belt use by RFPs dropped to 11.7% and use by RPs rose slightly to 6.0% when they were riding with nonbelted drivers. By contrast, when drivers were using their safety belt in 1987, so were 74.7% of RFPs and 72.0% of RPs. In 1988, when the driver was using a safety belt, belt use by RFPs increased to 79.3% but belt use by RPs dropped significantly to 33.2%. In 1989, RFP belt use was 73.8% and use by RPs was 34.8%. These 3 years of data show that when drivers were buckled up the passengers were also buckled up; when the drivers were not, the passengers were not. The most important finding from these data is that belt use by occupants in the seat positions not covered by the MUL had a much lower ($p < .01$) belt use rate in the post-MUL

TABLE 7

Use of Safety Belts: Towns

Occupant Seat Position	Belt Used	Pre-MUL 1987 Number	Pre-MUL 1987 Percent	Post-MUL 1988 Number	Post-MUL 1988 Percent	Post-MUL 1989 Number	Post-MUL 1989 Percent
Driver	Lap Only	22	0.8	70	2.8	41	1.5
	Lap/Shoulder	503	19.3	1,320	53.0	1,279	47.6
	None	2,080	9.8	1,101	44.2	1,368	50.9
Right Front Passenger	Lap Only	16	1.8	41	5.0	11	1.2
	Lap/Shoulder	131	14.9	343	41.8	346	38.1
	Child "A"	13	1.5	10	1.2	17	1.9
	Child "Z"	4	0.5	6	0.7	1	0.1
	None	714	81.3	421	51.3	533	58.7
Remaining Passengers	Lap Only	55	12.8	52	10.7	45	9.2
	Lap/Shoulder	10	2.3	3	0.6	14	2.9
	Child "A"	33	7.7	35	7.2	34	7.0
	Child "Z"	20	4.7	20	4.1	9	1.8
	None	312	72.6	375	77.3	386	79.1

TABLE 8

Association Between Driver and Passenger Use of Safety Belts: Towns

WHEN DRIVERS NOT USING SAFETY BELTS							
		Pre-MUL		Post-MUL			
Occupant Seat Position	Occupant Use of Belt	1987 Number	1987 Percent	1988 Number	1988 Percent	1989 Number	1989 Percent
Right Front Passenger	Belted	30	4.3	64	15.8	56	11.7
	Not Belted	674	95.7	341	84.2	421	88.3
Remaining Passengers	Belted	31	9.2	13	5.1	16	6.0
	Not Belted	306	90.8	240	94.9	251	94.0
WHEN DRIVERS USING SAFETY BELTS							
		Pre-MUL		Post-MUL			
Occupant Seat Position	Occupant Use of Belts	1987 Number	1987 Percent	1988 Number	1988 Percent	1989 Number	1989 Percent
Right Front Passenger	Belted	130	74.7	330	79.3	318	73.8
	Not Belted	44	25.3	86	20.7	113	26.2
Remaining Passengers	Belted	67	72.0	77	33.2	77	34.8
	Not Belted	26	28.0	155	66.8	144	65.2

TABLE 9

Belt Use by Sex: Towns

Occupant Seat Position	Sex of Occupant	Pre-MUL		Post-MUL			
		1987		1988		1989	
		Number	Percent	Number	Percent	Number	Percent
Driver	Male	216	17.8	574	49.0	509	42.5
	Female	309	22.2	816	61.9	811	54.4
Right Front Passenger	Male	62	20.7	102	37.1	103	33.2
	Female	98	16.9	292	53.5	271	45.3
Remaining Passengers	Male	45	22.4	37	16.2	49	20.6
	Female	50	21.8	53	20.6	44	17.6

periods than did passengers in these same seat positions in the pre-MUL period. It appears that the MUL caused a decline in rear seat safety belt use.

Data on belt use according to sex are shown in Table 9. In each of the 3 years, female drivers used belts at a rate higher than for males. In the 2 years post-MUL, female rates of use were nearly 12 points (27%) higher. Male driver use was 17.8% in 1987, peaked at 49.0% in 1988, and dropped to 42.5% in 1989. Female drivers had rates of 22.2%, 61.9%, and 54.4% in these same 3 years.

The same rise followed by a fall in rates experienced by drivers in 1988 and 1989 also occurred for RFPs. RFPs had lower belt use rates than did drivers except for males in 1987. Over the 3 years, the rate for male RFPs increased from 20.7% in 1987, peaked at 37.1% in 1988, and dropped to 33.2% in 1989. During the same period, the rates for female RFPs were 16.9%, 53.5%, and 45.3%. For both male and female RPs, belt uses post-MUL were lower than pre-MUL. In the 2 years post-MUL, RP belt uses were much lower than for drivers and RFPs. Fewer than one-fifth of RPs used a safety belt system in the 2 years post-MUL.

Belt use data by age are shown in Table 10. In the 1987 to 1989 period, the belt use rate for each driver age classification was higher post-MUL than pre-MUL. Preadult driver belt use increased each year and rose from 14.3% in 1987 to 47.4% in 1989. Use rates for young adult drivers increased from 23.0% (1987) to 51.9% (1988) and then dropped to 45.2% (1989). Belt use rates for middle and older adults were less than 20% in 1987, peaked at 56.1% and 62.7% in 1988, and dropped to just over 50% in 1989. The general trend in use patterns in the 2 post-MUL years was that the older the driver, the higher the belt use. In addition, by 1989, no single age group had a rate of use much different from the rates of the others, although only about half of all drivers in each age group used safety belts. In 1989, driver use rates had narrowed in range from the rates for the period immediately post-MUL.

TABLE 10

Belt Use by Age: Towns

Occupant Seat Position	Age of Occupant	Pre-MUL		Post-MUL			
		1987		1988		1989	
		Number	Percent	Number	Percent	Number	Percent
Driver	Preadult	3	14.3	8	34.8	9	47.4
	Young Adult	201	23.0	373	51.9	347	45.2
	Middle Adult	241	19.0	740	56.1	801	50.5
	Older Adult	80	18.2	269	62.7	163	51.7
Right Front Passenger	Infant	13	65.0	10	47.6	17	81.0
	Preadult	36	18.8	91	51.4	91	41.7
	Young Adult	48	18.5	83	43.5	81	37.0
	Middle Adult	29	12.6	122	45.5	120	38.5
	Older Adult	34	19.1	88	53.7	65	47.1
Remaining Passengers	Infant	33	40.2	35	31.0	34	51.5
	Preadult	53	20.6	44	17.6	47	14.9
	Young Adult	3	8.8	1	2.2	4	8.3
	Middle Adult	1	2.9	5	10.0	4	11.8
	Older Adult	3	8.8	1	2.2	4	8.3

Pre-, young, and older adult RFPs had a belt use rate within 1 percentage point of each other in 1987. These rates ranged from 18.5% for young adults to 19.1% for older adults. The highest RFP use was by infants (65.0%), and the lowest was by middle adults (12.6%). In 1988, fewer than one-half of the infant (47.6%), middle adult (45.5%), and young adult (43.5%) RFPs used a safety belt, and slightly more than one-half of the preadult (51.4%) and older adult (53.7%) RFPs did so. Rates in 1989, except for infants, were lower than in 1988 for each age group and varied from 37.0% (young) to 47.1% (older). The 1989 infant rate of use was the highest observed since such data began to be collected. For the other four RFP age classifications, use in 1989, although lower than in 1988, was higher than in the pre-MUL period. Post-MUL, with the exception of infants, older adults had the highest RFP use rate and young adults had the lowest rate in both surveys.

In all 3 years, there were few young, middle, or older adult RPs in the survey samples. In addition, few of them were safety belt users. Belt use by young and older adults did not exceed 9%, and that by middle adults did not exceed 12%. For the other two RP age categories, infant belt use was highest in 1989 (51.5%) and lowest in 1988 (31.0%); belt use by preadults fell from 20.6% to 14.9% over the 3 years. Although the MUL does not apply to rear seat occupants, the child safety seat law applies to infant rear seat occupants. Only about one-half of the RP infants were correctly in safety seats or belts in 1989. In addition, the data show a continuing decline in belt use by persons under 16 years of age.

Belt use data by survey time period are shown in Table 11. In the pre-MUL period (1987), driver use rates were 17.1% in the morning, 19.0% at mid-day, and

TABLE 11

Belt Use by Survey Time Period: Towns

Occupant Seat Position	Time Period	Pre-MUL		Post-MUL			
		1987		1988		1989	
		Number	Percent	Number	Percent	Number	Percent
Driver	A.M.	123	17.1	382	55.8	370	46.1
	Mid.	182	19.0	496	54.7	423	45.0
	P.M.	220	23.8	512	56.9	527	55.8
Right Front Passenger	A.M.	25	14.4	75	47.5	71	36.0
	Mid.	56	16.8	169	51.7	136	41.2
	P.M.	79	21.4	150	44.6	167	43.8
Remaining Passengers	A.M.	8	10.0	9	15.0	8	9.8
	Mid.	35	24.1	29	14.6	29	17.6
	P.M.	52	25.4	52	23.0	56	23.2

23.8% in the afternoon. In 1988, the first post-MUL period, driver use rates were much higher and less variable. More than one-half of the drivers used safety belts during each survey time period. In the second post-MUL period (1989), driver use rates were lower than in 1988 but were still much higher than the pre-MUL rates. The variability across the three time periods had also increased from that in 1988 and was nearly 11 percentage points in 1989. Just under one-half of the drivers used safety belts in the morning (46.1%) and at mid-day (45.0%), and over one-half used safety belts in the afternoon (55.8%) in 1989.

RFP safety belt use by survey time period followed the same pattern as that for drivers: a marked increase between 1987 and 1988 and a drop in 1989. The 1987 rates were as low as 14.4% (morning) and as high as 21.4% (afternoon). In 1988, the mid-day rate was the highest (51.7%), followed by the morning rate (47.5%) and the afternoon rate (44.6%). In 1989, the rates were 36.0% (morning), 41.2% (mid-day), and 43.8% (afternoon).

Except for the morning period in 1988, RP safety belt use was lower in each of the three time periods in both post-MUL surveys than they were pre-MUL. In 1989, RP belt use was only 9.8% in the morning, 17.6% at mid-day, and 23.2% in the afternoon. However, variations in use throughout the day may be less a function of the time of the day the observations occurred than of the towns in which the data were collected.

Belt use data by the area of the state surveyed are shown in Table 12. In the pre-MUL period (1987), no more than one-fourth of the drivers used a safety belt in any survey area. In the first post-MUL period (1988), over 50% of the drivers used safety belts in each survey area: 50.5% (southside), 57.5% (valley), and 59.6% (western). Driver belt use rates decreased from the 1988 peak in the second post-

TABLE 12

Belt Use by Area of the State Surveyed: Towns

Occupant Seat Position	Survey Area	Pre-MUL 1987 Number	Pre-MUL 1987 Percent	Post-MUL 1988 Number	Post-MUL 1988 Percent	Post-MUL 1989 Number	Post-MUL 1989 Percent
Driver	Western	175	20.1	514	59.6	486	53.7
	Valley	202	25.0	439	57.5	436	54.2
	Southside	148	16.0	437	50.5	398	40.7
Right Front Passenger	Western	49	17.3	141	49.1	137	45.5
	Valley	59	24.0	121	53.1	112	43.8
	Southside	52	14.9	132	43.1	125	35.6
Remaining Passengers	Western	21	17.4	45	27.4	27	19.6
	Valley	36	35.3	24	18.8	35	21.9
	Southside	38	18.4	21	10.9	31	16.3

MUL period but were higher than in 1987 (pre-MUL). The 1989 use rates were 40.7%, 54.2%, and 53.7%. Although the rates declined in this second period, the drop was small in both the western and valley areas. For all 3 years, the lowest driver use rates were in the southside area of the state.

Data were also compiled on RFP safety belt use in the three survey areas in which the towns were located. RFP belt use rates were lower than those for the corresponding driver categories during all 3 years. In 1987, the RFP belt use rates were 14.9% (southside), 17.3% (western), and 24.0% (valley). In 1988, the RFP rates peaked at 49.1% (western), 53.1% (valley), and 43.1% (southside). In 1989, belt use by RFPs declined by 9.3 percentage points in the valley, 7.5 points in the southside, and 3.6 points in the west. The 1989 use rates were 45.5% (western), 43.8% (valley), and 35.6% (southside).

In 1987, RP safety belt use rates were 17.4% (western), 18.4% (southside), and 35.3% (valley). In 1988, there was an increase in the RP rate of use in the western area to 27.4%, but declines in the valley area to 18.8% and in the southside area to 10.9%. One explanation for the increase in the western area is that two of the three communities initiated special belt use campaigns in 1988, but none of the communities in the other two areas of the state was involved in such activities. Although 1989 RP belt use in the western area had declined to 19.6%, a rate slightly higher than in the pre-MUL period, the rates in the valley and southside areas rose to 21.9% and 16.3%, but these rates were lower than the pre-MUL rates. In 1987, with one exception, RP use rates were higher than those for drivers and RFPs. In 1988 and 1989, RP belt use rates were much lower than those for drivers and RFPs. For all three seat position categories, the 1988 and 1989 southside RP rates were lower than those in the other two areas of the state.

The results of survey data collected from towns can be summarized as follows:

1. There was a major increase in safety belt use by drivers and RFPs post-MUL.
2. Eighteen months post-MUL, safety belt use by drivers and RFPs had declined from the peak rates ($p < .01$) but remained higher than the pre-MUL rates.
3. In 1989, RP safety belt use was lower ($p < .01$) than in 1987 (pre-MUL).
4. There was a positive association between driver and passenger use of safety belts.
5. In general, females used safety belts at a higher rate than did males.
6. Except for RFPs in 1988, safety belt use by drivers and passengers was higher in the afternoon all 3 years.
7. Driver and passenger safety belt use rates were much lower in the southside area of the state.

Safety Belt Use Statewide

The urban and town data were combined to produce statewide figures. There are no data from the rural areas of the state because data collection procedures, time, and expense mitigated against obtaining it. The inclusion of rural rates would likely lower the statewide figures reported here. The magnitude of this change is unknown, but based on a number of factors, it would probably not exceed a reduction of 5 percentage points in the overall rate of use for drivers and passengers. Although urban area data have been collected since 1974 and continuously since 1983, data from the towns began to be collected only in 1987; thus, a combined statewide rate is available only for the 1987–1989 period.

The statewide data in Table 13 indicate the rates of belt use by drivers, RFPs, and RPs. The various caveats for interpreting use rates were discussed in earlier sections of this report and apply to the statewide data as well. The statewide data follow the same pattern of use as that for urban areas and towns: a major increase in use post-MUL, followed by a drop in use during the next year. In 1987 (pre-MUL), just over one-third of drivers were using safety belts. In 1988 (post-MUL), nearly two-thirds of drivers were belt users; but in 1989, the rate dropped to 57.8% ($p < .01$). Just over 30% of RFPs and 27% of RPs were using safety belt systems in 1987. The 1988 use rates were 56.3% (RFPs) and 29.9% (RPs). In 1989, the RFP use rate dropped to 48.4% ($p < .01$) and the RP use rate dropped to 25.8% ($p < .02$). These data imply that implementation of the state's MUL produced an immediate major increase in the belt-wearing habits of drivers and RFPs but may have had a negative impact on belt use by RPs.

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TABLE 13

Use of Safety Belts: Statewide

Occupant Seat Position	Belt Used	Pre-MUL 1987 Number	Pre-MUL 1987 Percent	Post-MUL 1988 Number	Post-MUL 1988 Percent	Post-MUL 1989 Number	Post-MUL 1989 Percent
Driver	Lap Only	115	1.3	248	2.6	129	1.3
	Lap/Shoulder	2,842	33.0	6,062	63.0	5,636	56.5
	None	5,668	65.7	3,318	34.5	4,208	42.2
Right Front Passenger	Lap Only	82	3.0	137	4.8	40	1.3
	Lap/Shoulder	706	25.5	1,427	49.5	1,339	45.0
	Child "A"	50	1.8	59	2.0	63	2.1
	Child "Z"	19	0.7	17	0.6	6	0.2
	None	1,916	69.1	1,241	43.1	1,530	51.4
Remaining Passengers	Lap Only	267	17.4	223	13.8	166	10.7
	Lap/Shoulder	24	1.6	44	2.7	68	4.4
	Child "A"	128	8.3	217	13.4	167	10.7
	Child "Z"	88	5.7	58	3.6	36	2.3
	None	1,030	67.0	1,077	66.5	1,117	71.9

In 1987, 107 of the 285 (37.5%) infant passengers in child safety seats were categorized as being incorrectly restrained. In 1988, these figures were 75 of 351 (21.4%), and in 1989, 42 of 272 (15.4%). The primary errors in the use of child safety seats involved belt routing, seat orientation, and use of the arm bar/shields. Since this was an in-traffic survey, these misuse figures represent the most obvious cases. It is entirely possible that the actual rate of child safety seat misuse is greater than described here.

The data on the association between driver and passenger use of safety belts are given in Table 14. From these data, there are two basic findings: (1) when the driver was not belted, nearly all of the passengers were not belted, and (2) when the driver was belted, a large percentage of RFPs and RPs were also belted. For drivers *not* using their safety belts, belt use by RFPs increased from 9.1% in 1987 to 15.4% in 1988 and remained at this level in 1989. Belt use by RPs dropped from 10.8% in 1987 to 8.5% in 1989. In cases where the driver was using a safety belt system, belt use by RFPs increased from 75.6% in 1987 to 80.9% in 1988 and then dropped to 75.5% in 1989, the same rate as in the pre-MUL period. Belt use by RPs dropped by just over 20 percentage points between 1987 and 1988 and then declined again in 1989 to 41.5% ($p < .01$). For both classifications of drivers, belt users and nonusers, RP belt use rates in the post-MUL periods were much lower than that in the pre-MUL period. The RP rates were especially discouraging because these are the seat positions used primarily by occupants under 16 years of age (for those younger than 4 years old, there is a state statute requiring safety seat use). These data do indicate, however, that any method that successfully gets one vehicle occupant to buckle up is likely to work with the other occupants in the same vehicle.

TABLE 14

Association Between Driver and Passenger Use of Safety Belts: Statewide

WHEN DRIVERS NOT USING SAFETY BELTS							
		Pre-MUL		Post-MUL			
		1987		1988		1989	
Occupant Seat Position	Occupant Use of Belts	Number	Percent	Number	Percent	Number	Percent
Right Front Passenger	Belted	172	9.1	166	15.4	204	15.2
	Not Belted	1,720	90.9	915	84.6	1,135	84.8
Remaining Passengers	Belted	114	10.8	62	10.0	63	8.5
	Not Belted	938	89.2	561	90.0	677	91.5
WHEN DRIVERS USING SAFETY BELTS							
		Pre-MUL		Post-MUL			
		1987		1988		1989	
Occupant Seat Position	Occupant Use of Belts	Number	Percent	Number	Percent	Number	Percent
Right Front Passenger	Belted	666	75.6	1,457	80.9	1,238	75.5
	Not Belted	215	24.4	343	19.1	401	24.5
Remaining Passengers	Belted	305	62.9	422	42.4	338	41.5
	Not Belted	180	37.1	574	57.6	476	58.5

Safety belt use rates by sex are shown in Table 15. In each year, female drivers had rates higher than for males. In both post-MUL surveys, female driver use was nearly 20% higher than male driver use. Belt use by male drivers increased from 30.7% in 1987 to 59.9% in 1988 and then declined to 52.1% in 1989. Belt use by female drivers increased from 37.6% in 1987 to 70.9% in 1988 and then dropped

TABLE 15

Belt Use by Sex: Statewide

		Pre-MUL		Post-MUL			
		1987		1988		1989	
Occupant Seat Position	Sex of Occupant	Number	Percent	Number	Percent	Number	Percent
Driver	Male	1,287	30.7	2,806	59.9	2,479	52.1
	Female	1,670	37.6	3,504	70.9	3,286	63.0
Right Front Passenger	Male	274	29.9	445	47.3	413	39.9
	Female	564	30.4	1,178	60.7	1,029	53.0
Remaining Passengers	Male	192	26.3	222	28.9	201	27.5
	Female	214	26.5	262	30.8	209	25.4

to 63.0% in 1989. Although both male and female belt use rates in 1989 were lower than in 1988, the 1989 rates were still much higher than the rates in the pre-MUL period.

Female RFPs had belt use rates higher than those for male RFPs in the 1987–1989 period. In the two post-MUL years, the female RFP rates were approximately 30% higher than the male RFP rates. In 1987, 29.9% of the male and 30.4% of the female RFPs used a safety belt. In 1988, the rates peaked at 47.3% (males) and 60.7% (females). The 1989 rates, although lower than in 1988, were much higher than pre-MUL: 39.9% and 53.0%. Both male and female RFPs had rates of belt use lower than those for drivers in each of the 3 years.

There was little difference in belt use by male RPs over the 3-year period, with rates varying from 26.3% to 28.9%. Belt use by female RPs was slightly higher in 1988 (30.8%) than in 1987 (26.5%) and 1989 (25.4%). The rates of belt use, for both male and female RPs, were much lower than for male and female drivers and RFPs during all 3 years.

Table 16 shows safety belt use by age. The safety belt use rate by preadult drivers increased from 40.0% in 1987 to 58.1% in 1989. Safety belt use by young, middle, and older adult drivers followed the pattern of a large increase in use immediately post-MUL, followed by a decline 1 year later. In 1987, only 37.0% of the young adult drivers were safety belt users; the rate peaked at 62.5% in 1988 and was 55.3% in 1989. Over the 3 years, use rates by middle adult drivers were 33.8% (1987), 66.3% (1988), and 58.9% (1989). Safety belt use rates by older adult drivers were 29.0% in 1987, 70.3% in 1988, and 59.1% in 1989. In 1987, the rate of driver

TABLE 16

Belt Use by Age: Statewide

Occupant Seat Position	Age of Occupant	Pre-MUL		Post-MUL			
		1987		1988		1989	
		Number	Percent	Number	Percent	Number	Percent
Driver	Preadult	28	40.0	22	45.8	25	58.1
	Young Adult	1,155	37.0	1,875	62.5	1,695	55.3
	Middle Adult	1,400	33.8	3,532	66.3	3,419	58.9
	Older Adult	374	29.0	881	70.3	626	59.1
Right Front Passenger	Infant	50	58.8	59	67.0	63	82.9
	Preadult	196	36.9	289	59.6	242	46.0
	Young Adult	218	26.0	402	52.0	362	43.8
	Middle Adult	214	27.2	552	54.8	534	47.9
	Older Adult	160	30.2	321	60.9	241	55.4
Remaining Passengers	Infant	128	40.3	217	54.9	172	64.2
	Preadult	235	27.7	211	28.4	186	21.3
	Young Adult	17	11.3	13	6.3	17	9.6
	Middle Adult	9	8.0	28	14.9	25	15.6
	Older Adult	17	11.3	13	6.3	17	9.6

belt use declined as the age of the drivers increased. In 1988, the rate of belt use increased as driver age increased. In 1989, belt use was similar for all four age groups, varying by fewer than 4 percentage points. For each driver age group, belt use in 1989 was greater than in 1987, pre-MUL.

RFP belt use was also categorized by age. Infant use increased in each of the 3 years. Use rates for the other four age categories increased greatly between the pre-MUL period and the first post-MUL survey and then declined 18 months post-MUL. Infant use increased from 58.8% in 1987 to 82.9% in 1989. Preadult RFP belt use was 36.9% in 1987, peaked at 59.6% in 1988, and fell to 46.0% in 1989. Young adult RFP use peaked at 52.0% in 1988, having risen from 26.0% in 1987, and then declined to 43.8% in 1989. RFP belt use by middle adults was 27.2% in 1987 and 47.9% in 1989, having reached a peak of 54.8% in 1988. Safety belt use rates by older adult RFPs were greater than those for the other age classifications except for those of infants each year and for preadults in 1987. In 1987, 30.2% of the older adult RFPs were safety belt users; the rates of use were 60.9% in 1988 and 55.4% in 1989. RFP use rates were higher in every age group in 1989 than they were in 1987, pre-MUL. In general, RFP belt use was lower than for drivers each year for all age classifications; the two exceptions were older adults in 1987 and preadults in 1988.

When RP belt use was categorized by age, the data were variable. Infant use rose each year to 64.2% in 1989. Preadult RP use was nearly the same in 1987 and 1988 but dropped to 21.3% in 1989. No yearly belt use rate for young, middle, or older adult RPs exceeded 16% of those surveyed, and for the most part, fewer than 10% of the occupants surveyed used a safety belt. In all 3 years, RP belt use was lower than for drivers and RFPs in every age classification.

Data on the use of safety belts in the three daily time survey periods are shown in Table 17. As with the other categorizations of data, driver use of belts was the highest, followed by that of RFPs, and then by RPs. Within each category of vehicle occupant, there was little difference in use rates throughout the day. For drivers, just over one-third of the occupants used a safety belt in 1987, and the upper and lower daily rates varied by only 2 percentage points. In 1988, nearly two-thirds of the drivers used safety belts, and the rates varied only 3.7 percentage points. In 1989, over one-half of the drivers used safety belts, and the variation in use was 3.1 percentage points throughout the day. On a longitudinal basis, these data show a peak in use in the period 6 months post-MUL and a rate 18 months after the effective date of the law still higher than that in the pre-MUL period.

The RFP rates were lower than those for drivers, and there was less variability in use throughout the day. The rates varied by 1 percentage point in 1987, by 1.5 points in 1988, and by 4.7 points in 1989. Fewer than one-third of RFPs used safety belts in June 1987. Over one-half of RFPs used safety belts during each daily time period in 1988. In 1989, fewer than one-half of RFPs were belt users in the morning and afternoon and just over one-half in the mid-day period. Although belt use by RFPs declined between 1988 and 1989, the rates were higher than those pre-MUL.

TABLE 17

Belt Use by Survey Time Period: Statewide

Occupant Seat Position	Time Period	Pre-MUL		Post-MUL			
		1987		1988		1989	
		Number	Percent	Number	Percent	Number	Percent
Driver	A.M.	960	34.0	2,030	67.3	1,799	58.1
	Mid.	935	33.4	1,960	63.6	1,875	56.1
	P.M.	1,062	35.4	2,320	65.8	2,091	59.2
Right Front Passenger	A.M.	224	30.8	369	57.5	307	45.8
	Mid.	291	30.3	573	56.0	533	50.5
	P.M.	323	29.8	681	56.0	602	48.0
Remaining Passengers	A.M.	99	25.4	88	30.8	75	28.0
	Mid.	157	28.3	190	30.9	167	27.8
	P.M.	150	25.3	206	28.7	168	24.5

Belt use rates by RPs were lower than for drivers and RFPs during each survey period in all 3 years. In addition, RP use rates throughout the day varied by 3 percentage points in 1987, by 2 points in 1988, and by 3.5 points in 1989. RP safety belt use was higher in 1988 than in either 1987 or 1989. Just over one-fourth of RPs used safety belts in 1987. Although RP use rates peaked at nearly 30% in 1988, the increase was only 5 percentage points above that of the previous year. RP use rates were lower in 1989 (rates in the mid to upper 20s) than in 1988, and the rates were below the pre-MUL rates at mid-day and in the afternoon.

The statewide findings can be summarized as follows:

1. There was a sharp and significant increase in safety belt use by drivers and RFPs post-MUL.
2. Eighteen months post-MUL, safety belt use by drivers and RFPs had declined from the 1988 peak rates ($p < .01$) but remained higher than the pre-MUL rates.
3. Safety belt use by RP occupants was lower post-MUL ($p < .02$) than immediately pre-MUL.
4. A large proportion of the child safety seats were incorrectly used.
5. There was a positive association between driver and passenger use of safety belts.
6. Each year, female drivers and RFPs had higher rates of safety belt use than did males.
7. There was little difference within or between years in male and female RP uses of safety belts.

8. In the two post-MUL surveys, the highest rate of driver belt use was by older adults.
9. During all 3 years, the highest passenger use rates were by infants.
10. There was little difference in driver or passenger use rates when categorized by the time of day the data were collected.

SUMMARY OF FINDINGS

The data that form the basis for this summary are shown in Tables 18 and 19. Data on safety belt use rates in urban areas are shown in Table 18, and use rates from the town surveys and the combined urban and town rates that are considered statewide rates are shown in Table 19.

TABLE 18

Urban Use Rates

Category	Pre-MUL			Post-MUL	
	Urban 1985	Urban 1986	Urban 1987	Urban 1988	Urban 1989
Total Cars	5,436	6,155	6,020	7,137	7,285
Total Persons	8,135	9,235	9,022	10,331	10,385
Total Belt Use	27.5%	34.7%	37.9%	63.3%	56.1%
Driver Belt Use	28.4%	35.5%	40.4%	68.9%	61.0%
Passenger Belt Use	25.7%	33.1%	32.9%	50.8%	44.7%
Male Use	26.9%	32.6%	34.7%	58.4%	52.5%
Female Use	28.0%	36.6%	40.6%	67.4%	61.8%
Morning	30.7%	36.4%	38.0%	66.4%	59.4%
Mid-day	27.0%	34.0%	38.6%	61.7%	55.8%
Afternoon	25.6%	34.2%	37.2%	62.3%	54.0%
Infant Use	66.8%	69.3%	43.9%	66.2%	71.6%
Preadult Use	25.1%	34.7%	37.4%	45.9%	34.5%
Young Adult Use	24.6%	31.7%	38.6%	60.6%	55.8%
Middle Adult Use	28.4%	36.2%	38.6%	66.4%	61.4%
Older Adult Use	19.1%	30.4%	33.6%	68.6%	60.4%
Western Urban	23.2%	27.0%	28.5%	61.0%	50.1%
Northern Urban	33.0%	45.2%	46.8%	63.7%	58.8%
Central Urban	24.4%	28.6%	35.9%	68.6%	57.4%
Eastern Urban	27.1%	33.3%	35.7%	60.3%	56.4%

TABLE 19

Town and Statewide Use Rates

Category	Pre-MUL	Post-MUL		Pre-MUL	Post-MUL	
	Town 1987	Town 1988	Town 1989	State 1987	State 1988	State 1989
Total Cars	2,605	2,491	2,688	8,625	9,628	9,973
Total Persons	3,913	3,797	4,084	12,935	14,128	14,469
Total Belt Use	19.9%	49.4%	43.8%	32.5%	59.6%	52.6%
Driver Belt Use	20.2%	55.8%	49.1%	34.3%	65.5%	57.8%
Passenger Belt Use	19.5%	37.1%	33.5%	28.9%	46.8%	41.2%
Male Use	18.8%	42.6%	37.9%	30.1%	54.3%	48.5%
Female Use	20.8%	54.7%	48.1%	34.5%	64.0%	57.5%
Morning	16.0%	51.6%	41.5%	32.5%	63.0%	54.6%
Mid-day	19.0%	48.5%	40.9%	32.1%	57.7%	51.5%
Afternoon	23.4%	48.8%	47.9%	32.8%	58.7%	52.3%
Infant Use	45.1%	33.6%	58.6%	44.2%	57.1%	68.3%
Preadult Use	19.6%	31.8%	26.6%	31.7%	40.9%	31.5%
Young Adult Use	21.6%	47.9%	41.8%	33.8%	57.5%	52.2%
Middle Adult Use	17.7%	52.9%	47.9%	32.2%	63.0%	57.6%
Older Adult Use	18.6%	58.4%	48.5%	28.6%	65.2%	56.7%
Western Town	19.2%	53.3%	48.4%	—	—	—
Valley Town	25.7%	52.2%	47.7%	—	—	—
Southside Town	16.0%	43.2%	36.5%	—	—	—

The major study findings are as follows:

1. There were gradual increases in urban area safety belt use by drivers and passengers from 1985 through 1987, a sharp increase in 1988, and a decline ($p < .01$) in 1989 (see Figure 2).

2. Over one-half of the young, middle, and older adult occupants in urban areas used safety belts in both years post-MUL (see Figure 3).

3. Except in 1987, nearly two-thirds of all infants in urban areas were using safety belt systems.

4. Urban area belt use rates were generally highest in the northern and lowest in the western areas of the state (see Figure 4).

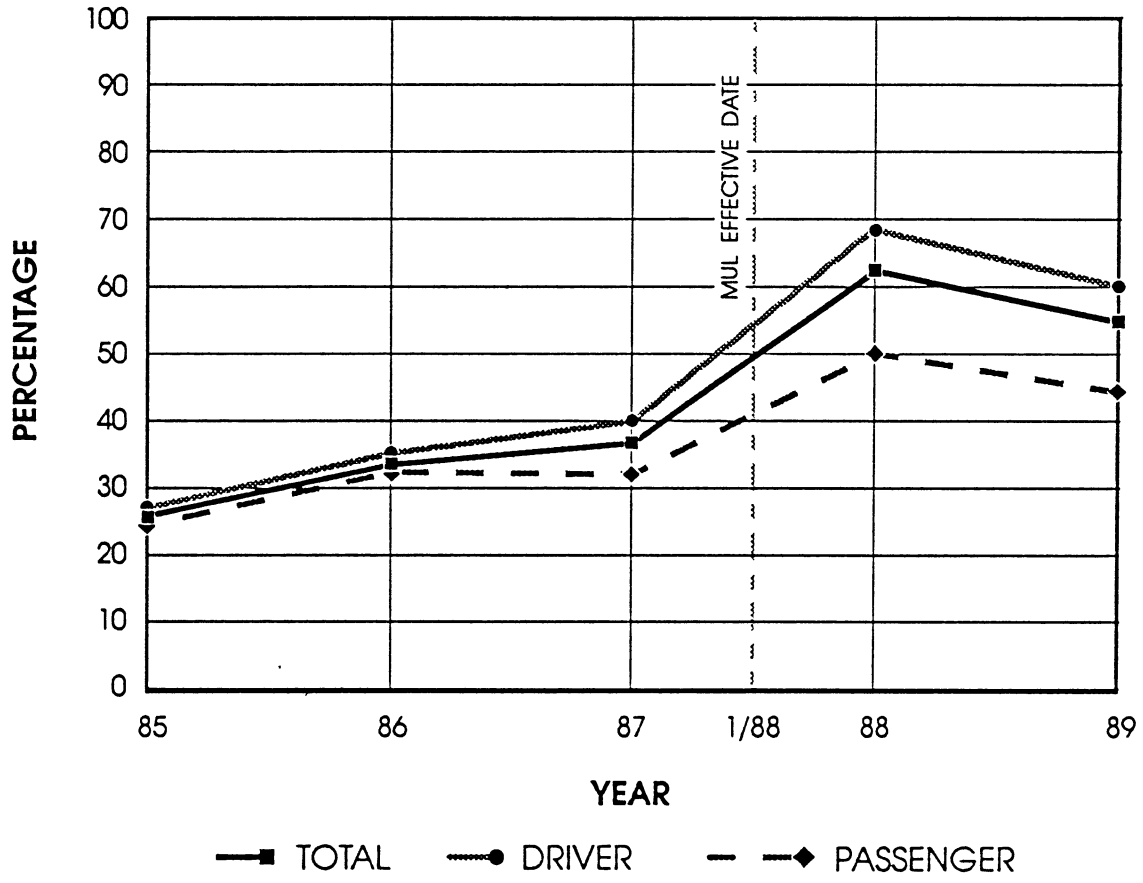

Figure 2. Urban Safety Belt Use by Seat Position.

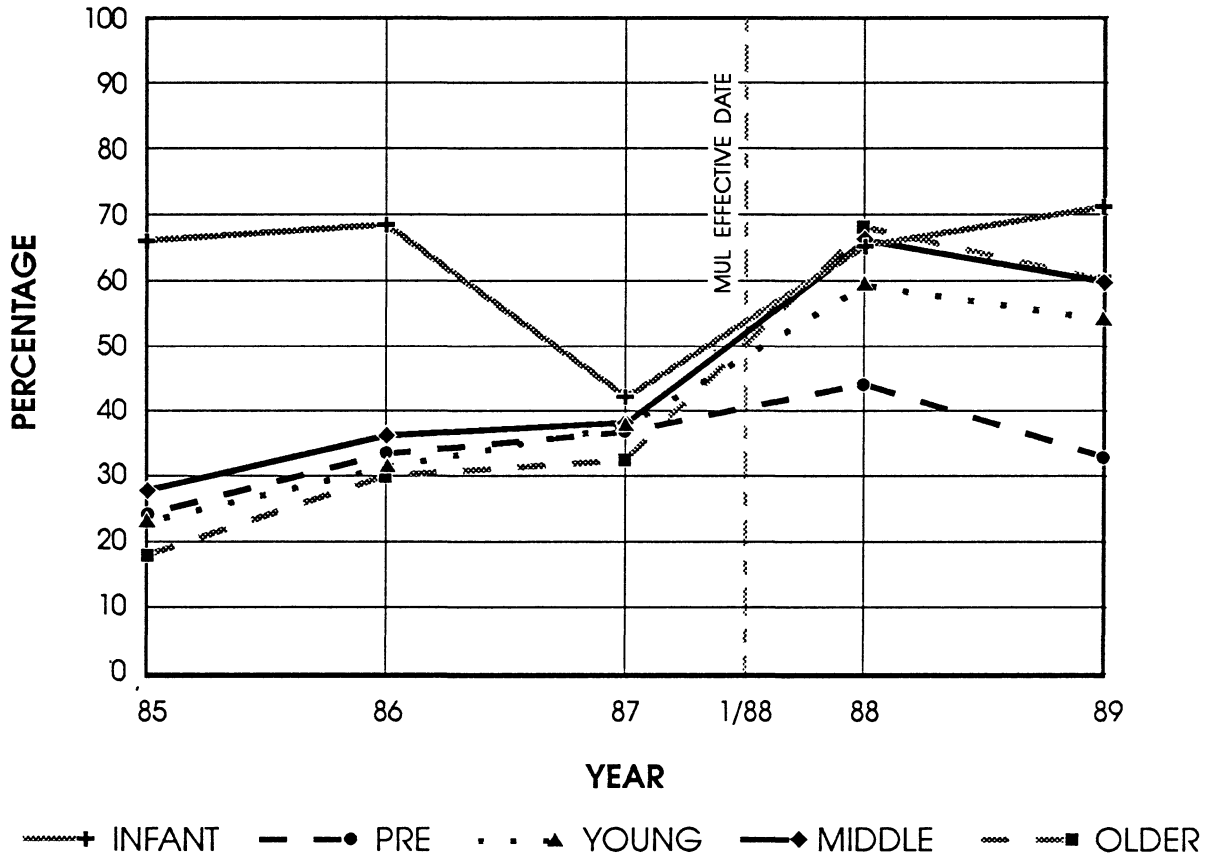

Figure 3. Urban Safety Belt Use by Age.

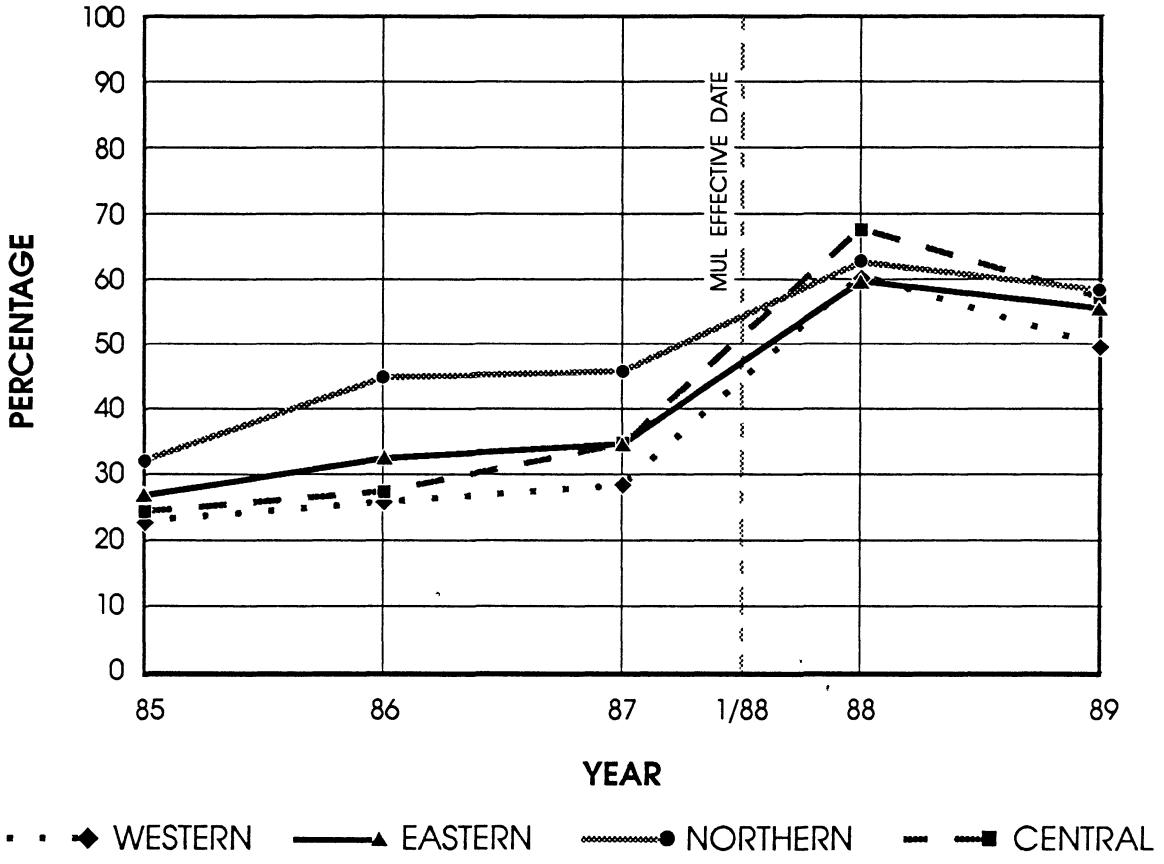

Figure 4. Urban Safety Belt Use by Area of the State.

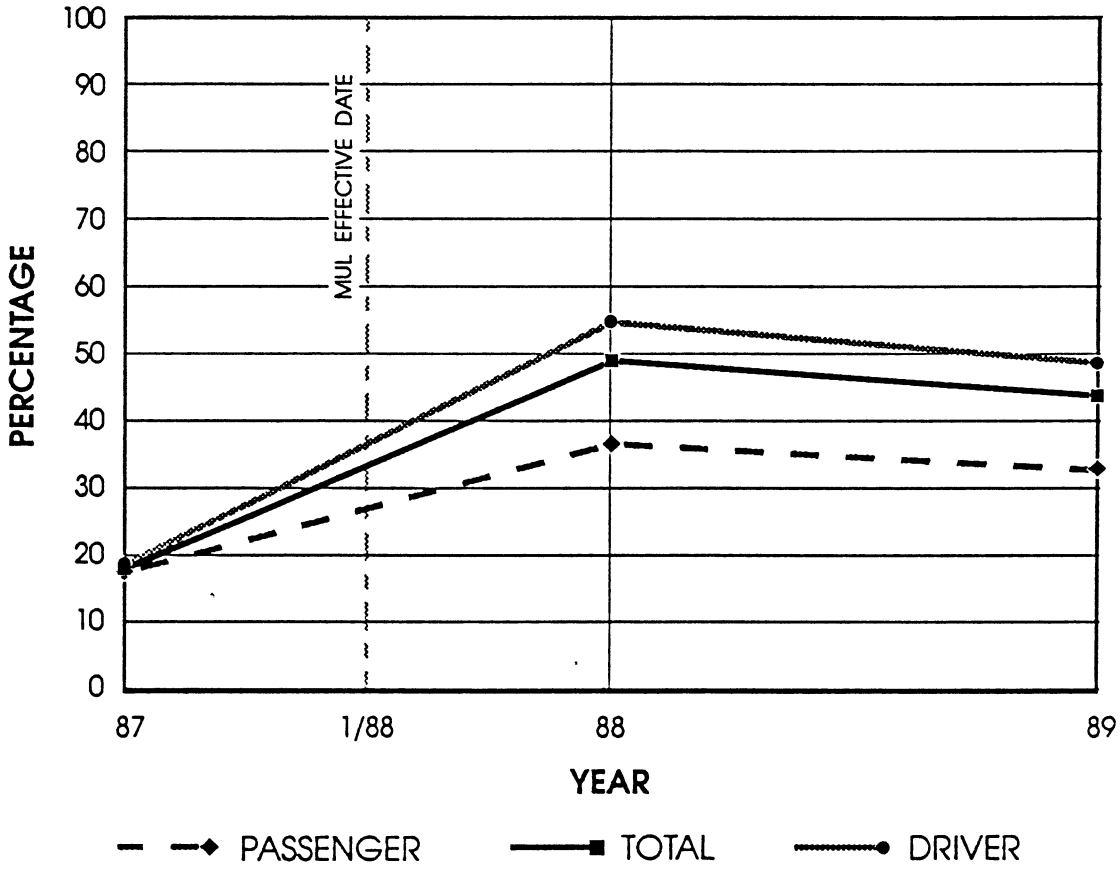

Figure 5. Town Safety Belt Use by Seat Position.

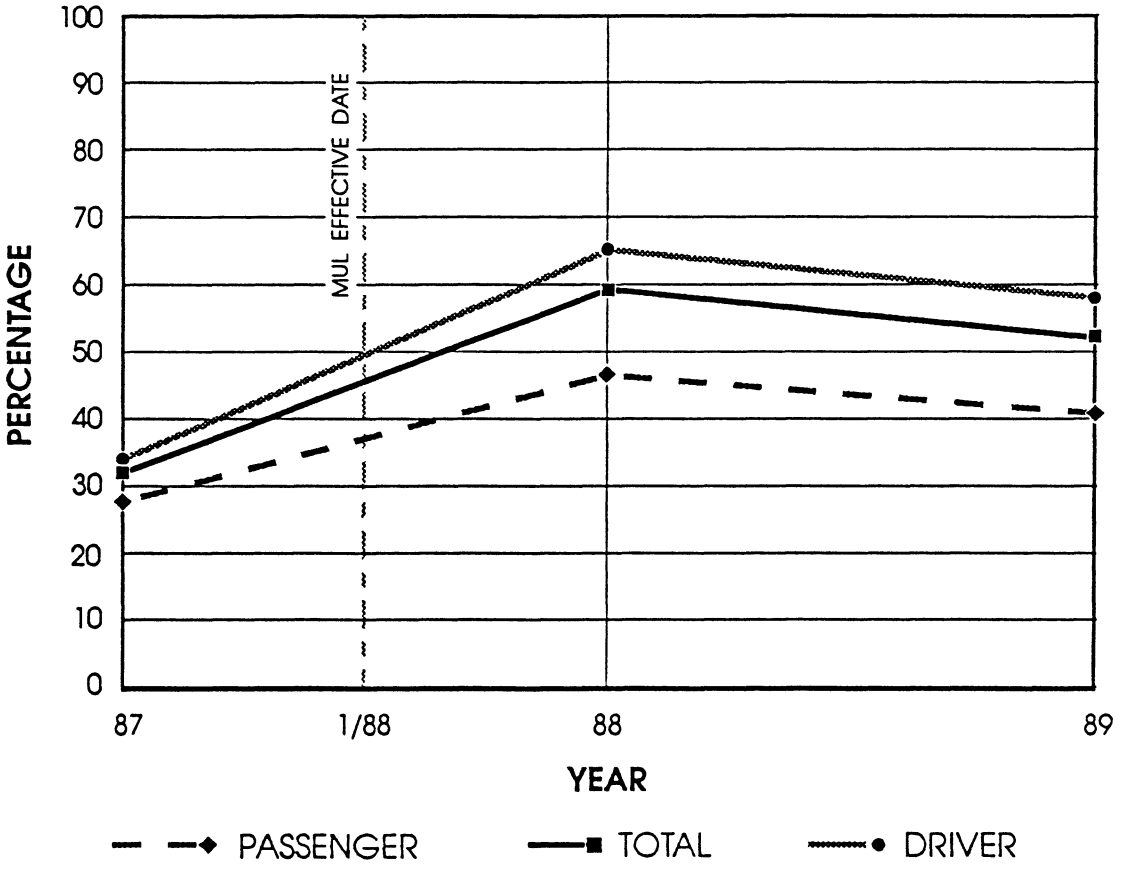

Figure 6. Statewide Safety Belt Use by Seat Position.

5. Town data indicate a sharp rise in use by drivers and RFPs in the first year post-MUL, followed by a decline ($p < .01$) in use rates in the following year (see Figure 5).

6. Each year, driver and passenger use rates in towns were much lower than those for urban areas.

7. There was a sharp increase in statewide safety belt use rates by drivers and RFPs between 1987 and 1988, followed by a decline ($p < .01$) in 1989. There was also a decline ($p < .02$) in use by RPs between 1988 and 1989 (see Figure 6).

8. Safety belt use by remaining passengers (rear seat occupants) was lower ($p < .01$) in the post-MUL period than in the pre-MUL period.

9. A large proportion of the child safety seats were classified as obviously misused (37.5% in 1987, 21.4% in 1988, and 15.4% in 1989).

10. There was little difference in belt use rates when classified according to the time of day data were collected.

CONCLUSIONS

1. During the 3 years prior to the passage of Virginia's MUL, there was a gradual increase in safety belt use by both drivers and passengers. The reasons for these changes cannot be determined from the data. Some of this increase could have resulted from increased publicity and some from the passage of the child safety seat law, which may have had a spillover effect with regard to other vehicle occupants. The sharp rise in belt use between 1987 and 1988 resulted from the implementation of the MUL on January 1, 1988. The drop in use in 1989 was not unexpected. Nearly every jurisdiction that has passed an MUL has shown a rapid rise in use followed by a decline. Reasons typically cited for this phenomenon generally involve reductions in enforcement effort and public information activity.

2. The high rate of child safety seat use is attributable to the passage of the child safety seat law during the 1982 session of the Virginia legislature. Prior to 1983, fewer than 20% of the infants in surveyed automobiles were restrained in safety seats. Subsequent to the effective date of the statute, approximately two-thirds of observed infants were in a child safety seat, and the rate has remained relatively stable over the years. The decline in 1987 in the rate of *correct* child seat use was the result of a change in the data collection process. A special training session on the identification of correct use patterns resulted in observers being less lenient in their recording of correct child seat use. The combined correct and incorrect use in 1987 was similar to the correct use rates from the previous 4 years. In 1988, child safety seat use was similar to use in

the years prior to 1987. Although special training in correct use was given to the field observation personnel, the process was not so strongly emphasized as in 1987. Child safety seat use in 1989 was the highest of any year the data have been collected, and this could have been the result of an increased sensitivity to child safety on the part of drivers. Although the rate of incorrect use has declined, it is apparent that additional work is necessary to educate parents in the proper installation of child safety seats and in the correct placement of their children in the seat itself.

3. There was a considerable difference between the safety belt use rates in the urban areas and in the towns, with the rates in the urban areas being much higher. There were also large differences in the rates within the four urban areas and among the towns surveyed. Although these data do not identify the reasons for these differences, other studies have suggested that factors such as socioeconomic status, level of education, and race influence rates of safety belt use. Without a major increase in belt use by persons outside the metropolitan areas, there is little possibility that the overall belt use rate in Virginia will exceed the 70% goal for safety belt use throughout the state.

4. The low RP use rates, as compared with those for drivers and RFPs (groups affected by the state's MUL), suggest that a use law which included rear seat occupants would increase belt use by these persons.

5. The consistency of use throughout the day for each of the occupant seat positions is a positive sign for the conduct of observational surveys of safety belt use. Because the range of rates is small, the collection of data can be set up to satisfy other survey requirements first and then scheduled for the most convenient hour of the day without biasing the results.

RECOMMENDATIONS

1. Efforts to bolster safety belt use in Virginia should be directed to the following:

   - residents of towns and rural areas
   - occupants of the rear seating positions of automobiles
   - younger males (17 through 30 years of age)
   - areas of the state in which use rates have declined to or have remained below one-half of those observed.

2. Information and enforcement efforts should be increased during periods when motor vehicle occupants are traveling to and from work.

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