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Abstract <p>This report was prepared in response to a request from the Transportation Safety Administration of the Virginia 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.</p> <p>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 over two time periods: (1) 1974 through 1977, and (2) 1983 through 1990. Until 1987, data were collected in only the four major metropolitan areas of the state. In 1987, survey sites were added in nine smaller communities. These communities are referred to as "towns," although several are legally classified as cities.</p> <p>Prior to enactment of the child safety seat law in 1982 and the safety belt mandatory use law in 1987, safety seat and belt use by the affected groups (children under 4 years of age and all front seat occupants, respectively) 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 safety seat use rate remained relatively stable over the entire 8-year postlaw period, at approximately 66% of those surveyed. The front seat occupant rate peaked at nearly 62% in the first 6 months after the effective date of the law, declined to about 55% ($p < .01$) in 1989, and was nearly 57% in 1990.</p> <p>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 safety seats were misused in an obvious way; and (4) with the exception of infants, older adults had the highest rates of use.</p> <p>It was concluded that the major reason for the increase in safety seat and belt use was the passage of the statutes.</p> <p>Several actions are recommended to increase statewide safety belt use. These include (1) directing public information and enforcement efforts toward residents of smaller communities and rural areas, occupants of the rear seat, young males, and areas of the state where use rates are below 50%, and (2) amending the safety belt mandatory use law to include rear seat occupants.</p>						

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

THE 1990 UPDATE

Charles B. Stoke
Senior Research Scientist

A report prepared by the Virginia Transportation Research Council
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(The opinions, findings, and conclusions expressed in this
report are those of the author and not necessarily
those of the sponsoring agencies.)

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EXECUTIVE SUMMARY

Motor vehicle safety research has consistently shown that using safety belts is an easy and effective way to reduce serious and fatal injuries. A number of surveys have also shown that the motoring public expresses belief in the life-saving potential of safety belt use. Because a substantial proportion of motorists do not use safety belts, federal and state efforts have been initiated to increase belt use.

In an effort to track changes in safety belt use by Virginia motorists due to enactment of various statutes, enforcement campaigns, and public information efforts, a series of surveys were conducted over two time periods: (1) 1974 through 1977, and (2) 1983 through 1990. Prior to 1987, data were collected from only the four major metropolitan areas of the state (Northern Virginia, Tidewater, Richmond, and Roanoke). From 1987 through 1990, survey sites were added in nine smaller communities. These communities are referred to as "towns," although several are legally classified as cities.

Prior to enactment of the child safety seat law in 1982 and the safety belt mandatory use law (MUL) in 1987, safety seat and belt use by the affected groups (children under 4 years of age and all front seat occupants, respectively) 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. Child safety seat use has remained relatively stable over the 8-year postlaw period, at approximately 66% of those surveyed. The front seat use rate peaked at 61.8% in June 1988, 6 months after the effective date of the law; declined to 55.1% in June 1989; and increased slightly to 56.8% in June 1990.

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 is concluded that the major reason for the increase in child safety seat and safety belt use was passage of the statutes requiring their use.

Several recommendations are made to increase safety belt use. These include (1) directing public information and enforcement efforts toward residents of smaller communities and rural areas, occupants of the rear seat positions, young males, and areas of the state where rates of use are below 50%, and (2) amending the MUL to include rear seat occupants.

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INTRODUCTION

Over the past decade, motor vehicle safety research has consistently shown that the use of automobile safety belts (hereinafter called belts) is one of the easiest and most efficient methods of preventing the deaths and injuries that result from motor vehicle crashes. In addition, a number of surveys have shown that the motoring public accepts as fact the injury-reduction and life-saving potential of belts. Although a majority of Virginians use belts, a substantial proportion do not. Therefore, a number of initiatives have been undertaken at the local, state, and national levels in an attempt to bolster the use of these safety devices. These initiatives have had varying degrees of success.

In an effort to ascertain 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 earlier studies used questionnaire and interview formats, and the more recent studies used observational techniques.

Observational surveys of belt use in Virginia have been conducted in two series: (1) 1974 through 1977, and (2) 1983 through 1990. Data were collected in February of 1974, 1975, and 1976 and in June of each of the other 9 survey 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 safety seats (hereinafter called safety seats). After the 1977 survey, transportation safety program management determined that annual updates were not necessary and that surveys would be conducted only after the occurrence of an event that would be expected to change the pattern of belt or safety seat 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, the second series of studies was initiated to collect data on the use of safety seats. Data were also collected on the use of belts by other vehicle occupants. The second signif-

icant event was the passage of a law (House Bill 1210) during the 1987 session requiring all front seat occupants of motor vehicles to use a belt. This law, known as the mandatory use law (MUL), became effective on January 1, 1988. In addition to the enactment of these two statutes, efforts by various state and private groups, members of the legislature, and the print and electronic media may have influenced use rates and patterns. For these reasons, data collection on safety seat and belt use has continued since 1983.

PURPOSE

This study had three purposes: (1) to determine the extent to which the use rate changed after enactment of the law mandating the use of safety seats, (2) to determine the extent to which the use rate changed after enactment of the MUL, and (3) to determine belt user (and nonuser) characteristics for use in subsequent efforts to increase belt use.

METHODS

Survey Sites

The number and location of survey sites were based on a set of criteria developed by the author, who had input from both the state and federal safety establishments. The total number of sites in an area was determined by the number of persons living in the part of the state being surveyed. A particular site in a community was selected on the basis of safety for survey personnel, traffic volume, type of road system, and whether persons and vehicles traveling through the site were a good representation of the socioeconomic mix of the community. Input for site selection was obtained from local police officials, state agency staff, people in business and industry, and other researchers.

Urban Areas

When the study was initiated in 1974, the focus was to determine belt use rates for persons traveling in the metropolitan areas of Virginia. When the study was reestablished in 1983, the focus was still on the urban areas of the state. In June of 1983, and of each year since, 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 a survey area were used each day. The

sites were chosen because they had a relatively high traffic volume and provided adequate and safe vantage points for the observers. Data were collected on each day of the week, and 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.

Towns

At the request of the Virginia Department of Motor Vehicles, data collection was initiated in communities other than the four major metropolitan centers of Virginia in 1987. 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 towns were eliminated from consideration because it was known that they were part of community programs to increase the belt use rate of their residents; this would bias the results of observed baseline use. Other towns were eliminated from consideration because of other characteristics, such as the absence of signalized intersections or their distance from the 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 | 11. Altavista | 21. Front Royal |
| 2. Tazewell | 12. Amherst | 22. Warrenton |
| 3. Marion | 13. Buena Vista | 23. Culpeper |
| 4. Wytheville | 14. Lexington | 24. Ashland |
| 5. Hillsville | 15. Clifton Forge | 25. Emporia |
| 6. Galax | 16. Covington | 26. South Hill |
| 7. Blacksburg | 17. Waynesboro | 27. Clarksville |
| 8. Christiansburg | 18. Staunton | 28. South Boston |
| 9. Chatham | 19. Harrisonburg | 29. Keysville |
| 10. Gretna | 20. Strasburg | 30. Farmville |

In addition, tables published by the Virginia Department of Transportation 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. In all, nine towns in three different geographic regions of the state were chosen to be included in the survey sample.

During one week in June, the survey team worked 1 day in Marion, Wytheville, and Galax (western towns); 1 day in Covington, Lexington, and Harrisonburg (valley towns); and 1 day in Emporia, South Boston, and Farmville (southside towns). 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 site to the next. The three survey time periods selected were (1) morning rush hour, (2) mid-day shopping/lunch hour, and (3) afternoon rush hour.

Survey Procedures

Only occupants of passenger cars with Virginia license plates were included in the observation sample. State, municipal, and commercial vehicles were excluded because the use of belts by the occupants of such vehicles is generally mandated by the employer as a condition of employment and thus might bias the actual community use rate.

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. The survey team was composed of two persons. If the traffic volume was not sufficient for each team member to survey up to three cars each in the same traffic lane, another lane at the same intersection was used. This other lane was selected on the basis of traffic volume prior to the survey team going into the field to collect data. Drawings of each intersection were prepared showing landmarks for identification purposes and were marked to show where each person should stand to collect data. 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 belt and safety seat use, age, and sex data (see Figure 1). Often, the occupants of the vehicle would reply to the question on the clipboard, but only information verified by the observer was recorded. In addition, some persons in vehicles in traffic lanes other than those identified to be used and persons in vehicles more distant in the traffic stream than specified would call attention to their belt use by sounding the horn, waving, etc. while hooking a thumb under the belt and pulling it forward. These data were not recorded, but the person was acknowledged by the survey team with a wave and a smile.

Using the data collection form, the observers recorded whether the driver and all passengers were using only a lap belt, both a lap and shoulder belt, a safety seat, or no form of safety restraint. The survey personnel also recorded the sex and estimated age group 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). Prior to 1986, any incorrect safety seat use was recorded as if the seat was not being used. For 1986 and subsequent years, 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 no restraint used (the "N" answer).

One major change was made in the survey procedures in 1987 involving the recording of the correct or incorrect use of a safety seat. This change came about

SAFETY BELT USAGE SURVEY FORM

DATE _____ START TIME _____ STOP TIME _____ LOCATION _____
 SHEET NO. _____ AT _____

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

because of concerns expressed at the state and national levels that the observers from previous surveys had been too lenient in their recording of correct use. A special workshop was held for members of the observation team. The instructor used samples of actual safety seats and had printed material, with pictures or drawings, showing various types (manufacturers) of safety seats and how they should be installed and used. Among the features studied 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 seat harness (ensuring that it was clipped together and that the child 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. For safety seat use to be recorded as correct (the "A" answer), *all* available features had to be used in a correct manner. If any feature was obviously used in an incorrect manner, the use was recorded as incorrect (the "Z" answer). Prior to 1987, only the belt routing and use of arm bars/shields were used to determine correct use or nonuse.

Statistical Testing

In carrying out this project and in preparing the report, the researcher considered conducting statistical tests to determine the significance of the differences in belt use from year to year. Both the short-term and long-term objectives of this research effort are to detail changes in belt use after enactment of the MUL or after 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 statistically significant difference could affect administrative decision making as it relates to legislative proposals or research activity: whether belt use in the 3 post-MUL years (1988, 1989, and 1990) was actually different from year to year. Stated another way: Was the drop in belt use between the 1988 peak and the 1989 and 1990 rates a statistically significant change? The chi-square (X^2) test of significance was carried out for selected sets of data to determine the level of the differences observed. For those comparisons where statistical values were computed, the text of the report indicates whether a difference existed and at what level it occurred.

FINDINGS AND ANALYSIS

For the purpose of this narration, the term *belt use* also reflects safety seat use.

The data in this report are discussed in three sections. In the first, data from the urban areas are reported and analyzed. Such data have been collected in the same communities since 1974, and for the most part, at the same survey sites. 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 MUL (pre-MUL) and for the 3 years after (post-MUL). Thus, pre-MUL and post-MUL use rates can be compared. The second section discusses data from the towns. Since town data collection was added in 1987, there are no comparable data from previous years. In the third section, the combined urban and town data are treated as statewide data. These combined data are available for only 1987, 1988, 1989, and 1990.

Use in Urban Areas

At the outset, it should be noted that large percentage changes in belt use from year to year and over the 6 years could be the result of small numerical changes in categories with relatively few cases. They could also be the result of an actual change in 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.

By Occupant Seat Position

Table 1 shows belt use rates by occupant seat position. The use rate for each seat position is based on the number of occupants in the position. Thus, the figures in Table 1 make it appear that the use of safety seats 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 use rates by age group.

Pre-MUL, there were yearly increases in belt use for both drivers and right front passengers (RFPs). The "child Z" category (a child in a safety seat and the seat incorrectly used) counted as nonuse for the purposes of these figures. In addition, in the discussion of the use rates shown in Table 1, the rate for drivers combines the use of lap only and lap/shoulder, and the rates for RFPs and RPs combine the use of lap only, lap/shoulder, and a correctly used safety seat into one percentage. The driver use rate increased from 28.4% in 1985 to 40.4% in 1987, and the RFP rate increased from 24.7% to 35.8%. The use rate for remaining passengers (RPs) increased from 27.4% in 1985 to 34.8% in 1986 and then declined to 29.1% in 1987.

In June 1988, 6 months post-MUL, belt use by drivers peaked at 68.9%. There was a significant drop in the rate to 61.0% ($p < .01$) in 1989 and a slight

Table 1
BELT USE BY SEAT POSITION OF OCCUPANT: URBAN AREAS

Occupant Seat Position	Belt Used	PRE-MUL					
		1985		1986		1987	
		Number	%	Number	%	Number	%
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	—	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
Occupant Seat Position	Belt Used	POST-MUL					
		1988		1989		1990	
		Number	%	Number	%	Number	%
Driver	Lap only	178	2.5	88	1.2	85	1.0
	Lap/shoulder	4,742	66.4	4,357	59.8	5,153	61.3
	None	2,217	31.1	2,840	39.0	3,162	37.6
Right front passenger	Lap only	96	4.7	29	1.4	40	1.7
	Lap/shoulder	1,084	52.6	993	48.0	1,131	49.5
	Child A	49	2.4	46	2.2	48	2.1
	Child Z	11	0.5	5	0.2	58	0.3
	None	820	39.8	997	48.2	1,059	46.3
Remaining passengers	Lap only	171	15.1	121	11.4	133	12.8
	Lap/shoulder	41	3.6	54	5.1	58	5.6
	Child A	182	16.0	133	12.5	100	9.6
	Child Z	38	3.4	27	2.5	11	1.1
	None	702	61.9	731	68.6	736	70.9

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.

increase to 62.3% in 1990. The same trend of a major rate increase immediately post-MUL and a subsequent drop followed by a small increase was observed for RFPs. In 1988, 59.7% of RFPs used belts; in 1989, only 51.6% used belts ($p < .01$); and in 1990, 53.3% used belts. The RP use rate post-MUL followed a slightly different trend from that of the other occupant categories. RP belt use was 34.7% in 1988, declined to 29.0% in 1989 ($p < .01$), and declined further to 28.0% in 1990.

As previously stated, a new category of data was included beginning in 1986; incorrectly used child safety seats (category "child Z"). Because this was an in-traffic survey, members of the observation team could not enter vehicles to check for proper safety seat installation. Only those items clearly identifiable from the outside of the vehicle were checked. Even with this lenient procedure, approximately 10% of infant RPs in 1990 and 17% in 1986, 1988, and 1989 were categorized as being in an incorrectly used child safety seat. In 1987, when the recording procedure for safety seat use was more stringent, nearly 42% of infant RPs were classified as being in an incorrectly used safety seat. Rates for incorrect safety seat use by RFPs were nearly 10% in 1986 and 1989, 14% in 1990, 18% in 1988, and just over 31% in 1987.

By Sex

Table 2 shows belt use rates by sex. Pre-MUL, belt use by male drivers increased by nearly 10 percentage points, from 26.4% to 36.0%. In 1988, there was an increase of 27.5 percentage points by male drivers, to a peak use rate of 63.5%. In 1989, the use rate dropped to 55.4%, and in 1990, there was a modest increase to 56.7%. Although the rates differ, belt use by female drivers followed the same pattern: a gradual 3-year increase from 30.6% to 44.7% between 1985 and 1987, a

Table 2
BELT USE BY SEX OF OCCUPANT: URBAN AREAS

		PRE-MUL					
Occupant Seat Position	Sex of Occupant	1985		1986		1987	
		Number	%	Number	%	Number	%
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 passenger	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		1989		1990	
		Number	%	Number	%	Number	%
Driver	Male	2,232	63.5	1,970	55.4	2,339	56.7
	Female	2,688	74.2	2,475	66.4	2,899	67.9
Right front passenger	Male	343	51.5	310	42.8	383	47.4
	Female	886	63.6	758	56.4	836	56.6
Remaining passenger	Male	185	34.2	152	30.8	153	31.3
	Female	209	35.2	165	28.8	138	25.1

very large increase to 74.2% in 1988, a decline to 66.4% in 1989, and a slight increase to 67.9% in 1990. Each year, the use rate by female drivers exceeded that for male drivers by 4 to 11 percentage points—the larger differences being observed post-MUL. For both male and female drivers, the lowest post-MUL use rate was greater than any pre-MUL use rate.

RFP belt use followed the same pattern as that for drivers. For males, the use rate rose from 25.4% to 34.4% pre-MUL, peaked at 51.5% in 1988, dropped to 42.8% in 1989, and rose to 47.4% in 1990. For females, the use rate rose from 24.3% to 36.4% pre-MUL, peaked at 63.6% in 1988, fell to 56.4% in 1989, and rose slightly to 56.6% in 1990. The lower RFP use rates in 1989 and 1990 were still higher than pre-MUL rates. In 1987, the year of highest use pre-MUL, just over 33% of the male and female RFPs used belts. In 1990, slightly less than 50% of the male RFPs and over 50% of the female RFPs were belt users. Two other findings of note are that (1) RFPs had a lower use rate than drivers, and (2) females, generally, had a higher use rate than males, and this disparity was more than 13 percentage points in 1989 and 9 percentage points in 1990.

Use rates for male and female RPs were less variable (i.e., unaffected by the passage of the MUL) than those for occupants of the other seat positions. Pre-MUL, belt use by male RPs varied from 27.8% in 1987 to 34.5% in 1986 and use by female RPs varied from 23.7% in 1985 to 34.9% in 1986. Post-MUL, male RP use rates varied from 30.8% in 1989 to 34.2% in 1988, and female RP use rates varied from 25.1% in 1990 to 35.2% in 1988. Each year, both male and female RP use rates were lower than those for drivers and RFPs.

By Age

Table 3 shows belt use rates by age. Although the preadult driver use rate varied from 28.6% in 1986 to 66.7% in 1989, there were too few of these drivers each year for data to be meaningful. Pre-MUL, belt use by young adult drivers increased from 27.6% to 42.4%. In 1988, 65.8% of the young adult drivers used safety belts; the rate declined to 58.6% in 1989 and rose to 59.5% in 1990. Pre-MUL, belt use by middle adult drivers rose from 29.9% to 40.4%; post-MUL, it was 69.7% in 1988, 62.1% in 1989, and 63.1% in 1990. Belt use by older adult drivers increased from 21.9% to 34.6% pre-MUL, rates lower than those for the other age groups. In 1988 and 1990, older adults had the highest use rates of all driver age groups, 74.3% and 69.7%, respectively, and the use rate of 62.1% in 1989 was equal to that for middle adults and higher than for young adults.

When RFP belt use was categorized by age, 76.4% of the infants used belts (i.e., correctly used a safety seat) in 1985 and 75.0% did so in 1986. In 1987, there was a large drop to 56.9%, primarily as a result of changes in the observation procedures. The infant use rate was 73.1% in 1988, a rate slightly lower than in 1985

Table 3
BELT USE BY AGE OF OCCUPANT: URBAN AREAS

		PRE-MUL					
Occupant Seat Position	Age of Occupant	1985		1986		1987	
		Number	%	Number	%	Number	%
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		1989		1990	
		Number	%	Number	%	Number	%
Driver	Preadult	14	56.0	16	66.7	2	33.3
	Young adult	1,502	65.8	1,348	58.6	1,455	59.5
	Middle adult	2,792	69.7	2,618	62.1	3,503	63.1
	Older adult	612	74.3	463	62.1	278	69.7
Right front passenger	Infant	49	73.1	46	83.6	48	85.7
	Preadult	198	64.3	151	49.0	210	56.8
	Young adult	319	54.8	281	46.2	283	46.4
	Middle adult	430	58.1	414	51.6	572	53.4
	Older adult	233	64.2	176	59.3	106	59.6
Remaining passengers	Infant	182	64.5	138	68.3	100	81.3
	Preadult	167	33.9	139	25.0	132	23.9
	Young adult	12	7.4	13	10.0	11	8.1
	Middle adult	23	16.7	21	16.7	35	18.9
	Older adult	12	7.4	13	10.0	11	8.1

and 1986; 83.6% in 1989; and 85.7% in 1990. The preadult RFP use rate rose from 30.0% in 1985 to 47.1% in 1987, peaked at 64.3% in 1988, dropped to 49.0% in 1989, and rose to 56.8% in 1990. Except for 1985, belt use by young adult RFPs was lower than that for the other age groups. In 1985, only 19.1% used a belt, and in 1987, only 29.3%. In 1988, immediately post-MUL, the young adult RFP use rate peaked at 54.8%; it was 46.2% in 1989 and 46.4% in 1990. Belt use by middle adult RFPs rose from 25.1% to 33.2% in the pre-MUL period. In 1988, 58.1% of the middle

adult RFPs were using belts; the rate was 51.6% in 1989 and 53.4% in 1990. Older adult RFPs had the lowest age group use rate in 1985 (14.6%), but by 1987, the rate was higher (35.8%) than that for young and middle adults. Post-MUL, the older adult RFP use rates of 64.2%, 59.3%, and 59.6% were also higher than those for young and middle adult RFPs. In most survey years, young, middle, and older adult RFPs had use rates lower than those for drivers of the same age groups.

Use rates by infant RPs were relatively consistent in the pre- and post-MUL periods. In 1987, when observation procedures for safety seat use were modified, the rate was only 40.3%. In 1985, 1986, 1988, and 1989, the rate varied between 64.4% and 68.3%. In 1990, the RP infant rate was 81.3%, the highest for these 6 years of data. The preadult RP use rate was 21.7% in 1985 and 30.7% in 1987. The use rate increased to only 33.9% in 1988, the first post-MUL year, and then dropped to 25.0% in 1989 and to 23.9% in 1990. The preadult RP use rates were lower in 1989 and 1990 than 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. In general, use rates for middle adult RPs were higher than those for young and older adult RPs. For the most part, few RP use rates for these three age classifications exceeded 15%. Over the 6 years of data presented in this report, RP use rates were much lower than those for drivers and RFPs. In addition, there was no sharp increase in RP use rates between 1987 and 1988, as seen for drivers and RFPs. This may be because the MUL does not apply to rear seat occupants. The data for the three age groups over 16 years of age also show how few adult passengers ride in the rear seat positions of automobiles on a daily basis.

By Daily Time Period

Table 4 shows belt use rates by daily time period. As with the other classifications of data, the driver use rate rose from 1985 through 1987, increased markedly in 1988, declined in 1989, and rose slightly in 1990. During any single year of the survey, driver use varied by 4 percentage points or less 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. 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% in 1988, just over 60% in 1989, and approximately 62% in 1990.

RFP belt use was also relatively stable throughout the day: the rates varied by approximately 5 percentage points in 1985 and 1989, less than 4 in 1987 and 1990, and less than 3 in 1986 and 1988. In addition, RFP use rates were lower than those for drivers for each time period. In 1985, only about 25% of the RFPs used belts; the rates increased to the low 30s in 1986 and the mid-30s in 1987. In 1988, nearly 60% of RFPs used a belt; the rate dropped to about 50% in 1989 and rose slightly to the low 50s in 1990. For the most part, the morning and afternoon rates were the same, with the mid-day rate having the most variance.

During 1985 and 1986, use rates by RPs were greater than those for RFPs and nearly equal to those for drivers. In the other 4 years, use rates by RPs were

Table 4
BELT USE BY DAILY TIME PERIOD: URBAN AREAS

		PRE-MUL					
Occupant Seat Position	Time Period	1985		1986		1987	
		Number	%	Number	%	Number	%
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 passenger	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		1989		1990	
		Number	%	Number	%	Number	%
Driver	A.M.	1,648	70.6	1,429	62.3	1,685	64.3
	Mid.	1,464	67.2	1,452	60.4	1,662	60.1
	P.M.	1,808	68.8	1,564	60.4	1,891	62.8
Right front passenger	A.M.	294	60.7	236	49.9	266	55.2
	Mid.	404	58.0	397	54.8	443	51.5
	P.M.	531	60.3	435	49.9	510	54.0
Remaining passenger	A.M.	79	35.0	67	36.0	58	34.5
	Mid.	161	38.7	138	31.7	105	28.2
	P.M.	154	31.3	112	25.2	128	25.8

lower than those for drivers and RFPs. In addition, in only one time period in 1986 did an RP rate exceed 40%. Use rates generally ranged from the mid-20s to the mid-30s. Although there were slight increases between 1987 and 1988, the RP use rates in 1989 and 1990 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. In 1989 and 1990, RP use rates were highest in the morning period (mid-30s) and lowest in the afternoon period (mid-20s). Because there are significantly fewer RPs than drivers and RFPs, these variances have a minimal effect on overall daily use rates.

The driver and RFP data for all 6 years and the RP data from 1987 and 1988 indicate that the results of observational surveys of 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 belts by their residents. Thus, it matters little what time of day the occu-

pants are surveyed for their belt-wearing habits because, if previous patterns continue, a survey team will find the same general rate of use throughout the day.

By Area of the State

Table 5 presents belt use rates by area of the state. Pre-MUL, there was a gradual increase in driver belt use in each of the four urban areas. Each year, use rates were highest in the northern area and lowest in the western area. There was considerable variation in the driver use rates each year and over the 3-year period. Other than in the northern area, no pre-MUL driver use rate exceeded 40%. In

Table 5
BELT USE BY AREA OF STATE: URBAN AREAS

Occupant Seat Position	Survey Area	PRE-MUL					
		1985		1986		1987	
		Number	%	Number	%	Number	%
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
Occupant Seat Position	Survey Area	POST-MUL					
		1988		1989		1990	
		Number	%	Number	%	Number	%
Driver	Western	1,004	65.4	834	54.8	1,112	56.9
	Northern	1,603	68.4	1,527	63.1	1,941	66.5
	Central	1,204	74.0	1,070	62.3	1,163	63.2
	Eastern	1,109	68.0	1,014	62.4	1,022	60.6
Right front passenger	Western	240	57.0	195	45.9	260	48.3
	Northern	396	60.8	373	52.9	447	59.4
	Central	234	62.2	191	51.5	216	49.3
	Eastern	359	58.7	309	54.3	296	53.0
Remaining passengers	Western	77	36.8	43	22.3	67	31.9
	Northern	136	38.3	136	35.0	101	28.5
	Central	74	36.6	43	23.8	46	21.0
	Eastern	107	29.1	95	29.8	77	30.3

1988, belt use by drivers peaked at 65.4% for the western area, 68.4% for the northern area, 74.0% for the central area, and 68.0% for the eastern area. The 1989 driver use rates were in the low 60s in the northern, central, and eastern areas and in the mid-50s in the western area. In 1990, rates were slightly higher than in 1989 but remained in the low-to-mid-60s in the northern, central, and eastern areas and in the mid-50s in the western area. Although the driver use rates in the past 2 years were lower than the rates immediately post-MUL, they are still higher than those pre-MUL.

In all survey areas, use rates for RFPs were always lower than those for drivers. However, the use patterns were the same: a small increase in each of the first 3 years, a large increase in 1988, a drop in 1989, and a minor increase in 1990. Pre-MUL, there were only two instances where the RFP rate use exceeded 40%, and both times it was in the northern area. Other area rates pre-MUL ranged from the high teens to the mid-30s; there was considerable variability in belt use between areas during a single year, and the variability was as much as 20 percentage points in 1986. Post-MUL, in 1988, variability between areas had narrowed considerably, with the range of differences being just over 5 percentage points. The peak rates for RFPs occurred in 1988 and 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 and 1990, RFP use rates were lower than those in 1988 but were higher than those pre-MUL. Variability also increased to over 8 percentage points in 1989 and 11 percentage points in 1990. In 1989 and 1990, nearly 50% of the RFPs used safety belts in the western and central areas and just over 50% used belts in the northern and eastern areas.

RP use rates were higher than for RFPs in 1985 and 1986 and lower in the other 4 years. During these 6 years, no RP use rate exceeded 40%. Pre-MUL, the RP use rate ranged from the mid-20s to the mid-30s. Post-MUL, in 1988, the peak belt use year, use rates were 29.1% in the eastern area, 36.6% in the central area, 36.8% in the western area, and 38.3% in the northern area. In 1989 and 1990, RP use rates varied from the low 20s to the low to mid-30s, rates similar to or below those pre-MUL.

Summary

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. By June 1988, 6 months post-MUL, belt use by drivers and RFPs had peaked.
3. By June 1989, belt use by drivers and RFPs had declined significantly ($p < .01$) from that in the previous year, but the rates were higher than those pre-MUL.

4. In June 1990, belt use by drivers and passengers showed a minor increase over that observed in 1989.
5. Belt use by RPs was significantly lower post-MUL ($p < .01$) than pre-MUL.
6. Use rates for female drivers and passengers were higher than for male drivers and passengers.
7. In 1989 and 1990, young adult drivers and passengers had the lowest use rates by age.
8. In both the pre-MUL and post-MUL periods, there was little difference in the use rates by daily time period.
9. In general, use rates for drivers and passengers were highest in the northern area and lowest in the western area.

Use in Towns

By Occupant Seat Position

Table 6 shows belt use rates by occupant seat position. The rate for drivers is a combination of lap only and lap/shoulder rates. The rates for RFPs and RPs are a combination of the rates for lap only, lap/shoulder, and correctly used safety seat. The use rate for each seat position is based on the number of occupants in the position. Driver belt use was 20.2% in 1987, 6 months pre-MUL; increased to 55.8% in 1988, 6 months post-MUL; and declined significantly to 49.1% ($p < .01$) in 1989. In 1990, driver belt use was 49.6%, a rate little different from that of 1989. RFP belt use was 18.2% in 1987, peaked at 48.0% in 1988, significantly declined to 41.2% ($p < .01$) in 1989, and fell to 39.3% in 1990. Belt use by RPs did not follow the same trend found for drivers and RFPs. RP belt use declined from 22.8% in 1987 to 18.5% in 1988. There was an increase to 19.1% in 1989 that was not statistically significant and a slight decline to 18.4% in 1990. These data show that belt use was much higher for front seat occupants, those to whom the MUL applies, than for rear seat occupants. They also show that RP belt use is lower in the post-MUL period than in the pre-MUL period.

By Sex

Table 7 shows belt use rates by sex. All 4 years, female drivers used belts at a rate higher than did males; in the 3 years post-MUL, female driver use rates were between 10.5 and 12.9 percentage points higher. Male driver use was 17.8% in 1987, 49.0% in 1988, 42.5% in 1989, and 44.2% in 1990. Female drivers had use rates of 22.2%, 61.9%, 54.4%, and 54.7% in these same 4 years.

Post-MUL, female RFPs had a much higher use rate than did males. Over the 3 years, 37.1%, 33.2%, and 31.8% of the male RFPs used belts. During the 3

Table 6
 BELT USE BY SEAT POSITION OF OCCUPANT: SMALL TOWNS

Occupant Seat Position	Belt Used	PRE-MUL		1988		POST-MUL		1990	
		1987		Number		Number		Number	
		Number	%	Number	%	Number	%	Number	%
Driver	Lap only	22	0.8	70	2.8	41	1.5	31	1.2
	Lap/shoulder	503	19.3	1,320	53.0	1,279	47.6	1,209	48.4
	None	2,080	9.8	1,101	44.2	1,368	50.9	1,259	50.4
Right front passenger	Lap only	16	1.8	41	5.0	11	1.2	4	0.5
	Lap/shoulder	131	14.9	343	41.8	346	38.1	316	37.4
	Child A	13	1.5	10	1.2	17	1.9	12	1.4
	Child Z	4	0.5	6	0.7	1	0.1	0	0.0
	None	714	81.3	421	51.3	533	58.7	514	60.8
Remaining passengers	Lap only	55	12.8	52	10.7	45	9.2	37	9.0
	Lap/shoulder	10	2.3	3	0.6	14	2.9	10	2.4
	Child A	33	7.7	35	7.2	34	7.0	29	7.0
	Child Z	20	4.7	20	4.1	9	1.8	7	1.7
	None	312	72.6	375	77.3	386	79.1	329	79.9

Table 7
 BELT USE BY SEX OF OCCUPANT: SMALL TOWNS

Occupant Seat Position	Sex of Occupant	PRE-MUL				POST-MUL			
		1987		1988		1989		1990	
		Number	%	Number	%	Number	%	Number	%
Driver	Male	216	17.8	574	49.0	509	42.5	533	44.2
	Female	309	22.2	816	61.9	811	54.4	707	54.7
Right front passenger	Male	62	20.7	102	37.1	103	33.2	98	31.8
	Female	98	16.9	292	53.5	271	45.3	234	43.5
Remaining passengers	Male	45	22.4	37	16.2	49	20.6	43	22.9
	Female	50	21.8	53	20.6	44	17.6	33	14.7

years, the use rates for female RFPs were 53.5%, 45.3%, and 43.5%. Except for males in 1987, RFPs had lower use rates than did drivers. Except for males in 1990, RP use rates post-MUL were lower than pre-MUL. Post-MUL, RP use rates were much lower than for drivers and RFPs. Fewer than 20% of RPs used belts post-MUL.

By Age

Table 8 shows belt use rates by age. Preadult driver belt use increased from 14.3% in 1987 to 47.4% in 1989. No preadult drivers were using belts in 1990, but there were only 2 preadult drivers in the survey sample. Use rates for young adult drivers increased from 23.0% in 1987 to 51.9% in 1988, dropped to 45.2% in 1989, and increased to 46.9% in 1990. Use rates for middle adult drivers were 19.0% in 1987, 56.1% in 1988, 50.5% in 1989, and 50.3% in 1990. Use rates for older adult drivers were 18.2%, 62.7%, 51.7%, and 59.2% during these 4 years. The general trend in use rates post-MUL was that the older the driver, the higher the belt use. In 1990, belt use by young adult drivers was nearly 26% lower than that for older adult drivers.

Safety seat use by infant RFPs in towns varied from 47.6% in 1987 (see earlier discussion of data collection procedures) to 100.0% in 1990 (when there were only 12 such RFPs). Pre-MUL, the belt use rate for preadults was 18.8%; post-MUL, the rates were 51.4%, 41.7%, and 41.4%. Only 18.5% of the young adult RFPs used belts in 1987. Post-MUL, the use rates were 43.5%, 37.0%, and 34.4%—rates lower than those for the other age groups. Middle adult RFP use rates were 12.6% pre-MUL and 45.5%, 38.5%, and 39.5% post-MUL. Pre-MUL, 19.1% of the older adult RFPs used belts; post-MUL, 53.7%, 47.1%, and 34.5% did so. Although RFP use rates in 1989 and 1990 were lower than the rates observed immediately post-MUL, they are nearly double the pre-MUL rates for each age group.

All 4 years, there were few young, middle, or older adult RPs in the survey samples, and few of them were belt users. Belt use by young and older adult RPs did not exceed 9% any year, and use by middle adults did not exceed 12%. For the other two RP age categories, infant safety seat use was highest in 1990 (67.4%) and lowest in 1988 (31.0%); belt use by preadults fell from 20.6% pre-MUL to 14.9% in 1989, then increased to 17.0% in 1990. Although the MUL does not apply to rear seat occupants, the child safety seat law applies to infant rear seat occupants. Only about 67% of the RP infants were correctly in safety seats in 1990. In addition, the data show a very low use rate for persons between 4 and 16 years of age.

By Daily Time Period

Table 9 shows belt use rates by daily time period. Pre-MUL driver use rates were 17.1% in the morning, 19.0% at mid-day, and 23.8% in the afternoon. In 1988, the first post-MUL survey year, driver use rates were much higher and less varied. More than 50% of the drivers used belts during each time period: 55.8%, 54.7%, and 56.9%. In 1989 and 1990, driver use rates were lower than in 1988 but were

Table 8
BELT USE BY AGE OF OCCUPANT: SMALL TOWNS

Occupant Seat Position	Age of Occupant	PRE-MUL		1988		1989		1990	
		1987		Number		Number		Number	
		Number	%	Number	%	Number	%	Number	%
Driver	Preadult	3	14.3	8	34.8	9	47.4	0	0.0
	Young adult	201	23.0	373	51.9	347	45.2	306	46.9
	Middle adult	241	19.0	740	56.1	801	50.5	892	50.3
	Older adult	80	18.2	269	62.7	163	51.7	42	59.2
Right front passenger	Infant	13	65.0	10	47.6	17	81.0	12	100.0
	Preadult	36	18.8	91	51.4	91	41.7	84	41.4
	Young adult	48	18.5	83	43.5	81	37.0	72	34.4
	Middle adult	29	12.6	122	45.5	120	38.5	145	39.5
Older adult		34	19.1	88	53.7	65	47.1	19	34.5
	Infant	33	40.2	35	31.0	34	51.5	29	67.4
	Preadult	53	20.6	44	17.6	47	14.9	41	17.0
	Young adult	3	8.8	1	2.2	4	8.3	1	1.8
Middle adult		1	2.9	5	10.0	4	11.8	5	7.6
	Older adult	3	8.8	1	2.2	4	8.3	1	1.8

Table 9
BELT USE BY DAILY TIME PERIOD: SMALL TOWNS

Occupant Seat Position	Time Period	PRE-MUL			POST-MUL				
		1987		1988		1989		1990	
		Number	%	Number	%	Number	%	Number	%
Driver	A.M.	123	17.1	382	55.8	370	46.1	310	47.5
	Mid.	182	19.0	496	54.7	423	45.0	399	44.9
	P.M.	220	23.8	512	56.9	527	55.8	531	55.4
Right front passenger	A.M.	25	14.4	75	47.5	71	36.0	51	32.1
	Mid.	56	16.8	169	51.7	136	41.2	114	37.7
	P.M.	79	21.4	150	44.6	167	43.8	167	43.4
Remaining passengers	A.M.	8	10.0	9	15.0	8	9.8	13	21.7
	Mid.	35	24.1	29	14.6	29	17.6	20	12.7
	P.M.	52	25.4	52	23.0	56	23.2	43	22.2

still much higher than the pre-MUL rates. The variability in use between morning, mid-day, and afternoon increased from that in 1988 and was nearly 11 percentage points. In 1989 and 1990, driver belt use was 46.1% and 47.5% in the morning, 45.0% and 44.9% at mid-day, and 55.8% and 55.4% in the afternoon. This variability in use throughout the day may be less a function of the time of day than of the towns in which the data were collected. As previously stated, data were collected in a different town during each time period each day.

Pre-MUL, RFP belt use was as low as 14.4% in the morning and as high as 21.4% in the afternoon. In 1988, the morning RFP use rate was 47.5%, the mid-day rate was 51.7%, and the afternoon rate was 44.6%. In 1989, the RFP use rates were 36.0% in the morning, 41.2% at mid-day, and 43.8% in the afternoon. In 1990, the RFP use rates were 32.1% in the morning, 37.7% at mid-day, and 43.4% in the afternoon. The 1990 RFP use rates were the lowest post-MUL. When use rates are considered on a post-MUL longitudinal basis, there was a 15.4 percentage point drop in use in the morning and a 14.0 point drop at mid-day from 1988 to 1990. There was only a 1.2-point decline in the afternoon. This may be an indication that changes in use are more a function of the towns used in the survey than of the time of day data were collected.

Except for the morning in 1988 and 1990, RP-belt use was lower in each of the three time periods in all three post-MUL surveys than it was pre-MUL. The 1988 rates were 15.0% in the morning, 14.6% at mid-day, and 23.0% in the afternoon. In 1989, RP belt use was 9.8% in the morning, 17.6% at mid-day, and 23.2% in the afternoon. In 1990, belt use by RPs was 21.7%, 12.7%, and 22.2% throughout the day.

By Area of the State

Table 10 shows belt use rates by area of the state. Pre-MUL, only 20.1% of the western drivers used a belt. The rate increased by nearly 3 times to 59.6% in 1988 and remained relatively high at 53.7% in 1989 and 53.5% in 1990. Driver belt use in the valley area was generally higher than in the other two groups of towns. Pre-MUL, 25.0% of these drivers used a belt; post-MUL, use rates were 57.5% in 1988, 54.2% in 1989, and 56.4% in 1990. In the southside area, only 16.0% of the drivers used belts pre-MUL. Post-MUL, southside driver belt use was 50.5%, 40.7%, and 40.3%. All 4 years, the lowest driver use rates were in the southside area.

Data were also compiled on RFP belt use in the three survey areas. RFP use rates were lower than those for the corresponding driver categories all 4 years. Pre-MUL, 17.3% of the western area RFPs used a belt; post-MUL, the use rates were 49.1% in 1988, 45.5% in 1989, and 44.6% in 1990. In the valley, the pre-MUL RFP use rate was 24.0%; post-MUL, the RFP use rates were 53.1%, 43.8%, and 42.9%. The southside area had the lowest RFP use rates all 4 years. Pre-MUL, only 14.9% used a belt. Post-MUL, the RFP use rates were 43.1%, 35.6%, and 32.4%. Although RFP belt use in 1990 was the lowest post-MUL, the rates in all areas were nearly double those observed pre-MUL.

Table 10
BELT USE BY AREA OF STATE: SMALL TOWNS

Occupant Seat Position	Survey Area	PRE-MUL			POST-MUL				
		1987		1988		1989		1990	
		Number	%	Number	%	Number	%	Number	%
Driver	Western	175	20.1	514	59.6	486	53.7	507	53.5
	Valley	202	25.0	439	57.5	436	54.2	376	56.4
	Southside	148	16.0	437	50.5	398	40.7	357	40.3
Right front passenger	Western	49	17.3	141	49.1	137	45.5	136	44.6
	Valley	59	24.0	121	53.1	112	43.8	85	42.9
	Southside	52	14.9	132	43.1	125	35.6	111	32.4
Remaining passengers	Western	21	17.4	45	27.4	27	19.6	25	18.8
	Valley	36	35.3	24	18.8	35	21.9	24	28.9
	Southside	38	18.4	21	10.9	31	16.3	27	13.8

For western town RPs, belt use was 17.4% pre-MUL. In 1988, RP belt use was 27.4%, and the rate declined to 19.6% in 1989 and to 18.8% in 1990. The RP use rate in the valley towns was 35.3% pre-MUL. The rate dropped to 18.8% in 1988 and then increased in the past 2 years to 21.9% and 28.9%. In the southside towns, pre-MUL RP use was 18.4%; post-MUL, the RP use rates were 10.9% in 1988, 16.3% in 1989, and 13.8% in 1990.

For all occupant seat positions, belt use was lowest in the southside towns. In addition, belt use by RPs was lower post-MUL. These two factors identify the southside towns as a target for special programs to increase safety belt use. The data also identify RPs, mainly rear seat occupants, as an area of concern and suggest that the MUL be amended to include them.

Summary

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

1. In June 1988, 6 months post-MUL, there was a major increase in belt use by drivers and RFPs over that observed pre-MUL.
2. Subsequent surveys in the post-MUL period show that belt use by drivers and RFPs declined significantly from the peak rates ($p < .01$) but remained higher than the pre-MUL rates.
3. RP belt use was significantly lower in 1989 and 1990 ($p < .01$) (post-MUL) than in 1987 (pre-MUL).
4. In general, female drivers and passengers used belts at a higher rate than did males.
5. Post-MUL, young adult drivers and passengers had the lowest belt use rates.
6. Except for RFPs in 1988, belt use by drivers and passengers was higher in the afternoon all 4 years.
7. Driver and passenger belt use rates were much lower in the southside area of the state each year data were collected.

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 use rates in other states reported in the literature, there would probably be a reduction of 3 to 5 percentage points in the overall use rate 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 1987–1990 period.

By Occupant Seat Position

Table 11 shows statewide belt use rates by occupant seat position. 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 use rates are combinations of the use rates for lap only, lap/shoulder, and correctly used safety seat as appropriate. The statewide data follow the same pattern of use as that for urban areas and towns: a major increase in use immediately post-MUL, followed by a drop in use in 1989 and a small increase in use in 1990. In 1987, 34.3% of all drivers surveyed were using belts. In 1988, 65.6% of the drivers were belt users; there was a significant drop in the rate to 57.8% ($p < .01$) in 1989, then an increase to 59.5% in 1990. In 1987, 30.3% of RFPs were using belt systems. Post-MUL, 56.3% of RFPs were using belts in 1988, there was a significant decline to 48.4% ($p < .01$) in 1989, and there was an increase to 49.5% in 1990. In 1987, 27.3% of RPs were using belts. Post-MUL, RP belt use was 29.9% in 1988, 25.8% ($p < .02$) in 1989, and 25.3% in 1990. These data imply that implementation of the state's MUL resulted in an immediate major increase in the belt-wearing habits of drivers and RFPs but did not increase belt use by RPs.

In 1987, 107 of the 285 (37.5%) infant passengers in safety seats were categorized as being incorrectly restrained. Post-MUL, the misuse figures were 75 of 351 (21.4%), 42 of 272 (15.4%), and 26 of 215 (12.1%). The primary errors in the use of 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 only the most obvious cases. It is possible that the actual rate of safety seat misuse is greater than that described here.

By Sex

Table 12 shows statewide belt use rates by sex. In each year, female drivers had use rates higher than those for males. Post-MUL, female driver use was more than 10 percentage points higher than male driver use. Belt use by male drivers increased from 30.7% in 1987 to 59.9% in 1988, declined to 52.1% in 1989, and was 53.8% in 1990. Belt use by female drivers increased from 37.6% in 1987 to 70.9% in

Table 11
BELT USE BY SEAT POSITION OF OCCUPANT, STATEWIDE

Occupant Seat Position	Belt Used	PRE-MUL			POST-MUL				
		1987		1988		1989		1990	
		Number	%	Number	%	Number	%	Number	%
Driver	Lap only	115	1.3	248	2.6	129	1.3	116	1.1
	Lap/shoulder	2,842	33.0	6,062	63.0	5,636	56.5	6,362	58.4
	None	5,668	65.7	3,318	34.5	4,208	42.2	4,421	40.6
Right front passenger	Lap only	82	3.0	137	4.8	40	1.3	44	1.4
	Lap/shoulder	706	25.5	1,427	49.5	1,339	45.0	1,447	46.2
	Child "A"	50	1.8	59	2.0	63	2.1	60	1.9
	Child "Z"	19	0.7	17	0.6	6	0.2	8	0.3
	None	1,916	69.1	1,241	43.1	1,530	51.4	1,573	50.2
Remaining passengers	Lap only	267	17.4	223	13.8	166	10.7	170	11.7
	Lap/shoulder	24	1.6	44	2.7	68	4.4	68	4.7
	Child "A"	128	8.3	217	13.4	167	10.7	129	8.9
	Child "Z"	88	5.7	58	3.6	36	2.3	18	1.2
	None	1,030	67.0	1,077	66.5	1,117	71.9	1,065	73.4

Table 12
 BELT USE BY SEX OF OCCUPANT: STATEWIDE

Occupant Seat Position	Sex of Occupant	PRE-MUL		1988		1989		1990	
		1987		Number		Number		Number	
		Number	%	Number	%	Number	%	Number	%
Driver	Male	1,287	30.7	2,806	59.9	2,479	52.1	2,872	53.8
	Female	1,670	37.6	3,504	70.9	3,286	63.0	3,606	64.8
Right front passenger	Male	274	29.9	445	47.3	413	39.9	481	43.1
	Female	564	30.4	1,178	60.7	1,029	53.0	1,070	53.1
Remaining passengers	Male	192	26.3	222	28.9	201	27.5	196	29.0
	Female	214	26.5	262	30.8	209	25.4	171	22.1

1988, dropped to 63.0% in 1989, and was 64.8% in 1990. Although both male and female driver use rates in 1989 and 1990 were lower than in 1988, the rates were still much higher than the rates pre-MUL.

Female RFPs had use rates higher than those for male RFPs each year data were collected. Pre-MUL, 29.9% of the male and 30.4% of the female RFPs used a belt. Post-MUL, male RFP use rates were 47.3%, 39.9%, and 43.1%, and the female use rates were 60.7%, 53.0%, and 53.1%. The 1989 and 1990 rates, although lower than in 1988, were much higher than pre-MUL. However, both male and female RFPs had use rates lower than those for drivers in each of the 4 years.

There was little difference in belt use by male RPs over the 4-year period, with rates varying from 26.3% to 29.0%. Belt use by female RPs was 26.5% pre-MUL and 30.8%, 25.4%, and 22.1% post-MUL. Use rates for both male and female RPs were much lower than those for male and female drivers and RFPs all 4 years. In 1989 and 1990, female RP use rates were lower than those for males and were also lower than the pre-MUL rate.

By Age

Table 13 shows statewide belt use rates by age. The use rate by preadult drivers increased from 40.0% in 1987 to 58.1% in 1989. In 1990, only 25.0% of the preadult drivers were using belts, but there were few of these occupants in the survey sample. 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 in 1989 and an increase in 1990. Except for older adults, the increase in 1990 was only 1.0 to 1.5 percentage points above the 1989 use rate. In 1987, 37.0% of the young adult drivers were belt users; the rate peaked at 62.5% in 1988, was 55.3% in 1989, and was 56.8% in 1990. Over the 4 years, use rates by middle adult drivers were 33.8%, 66.3%, 58.9%, and 60.0%. The use rates by older adult drivers were 29.0%, 70.3%, 59.1%, and 68.1%. In 1987, the driver use rate declined as the age of the drivers increased. In 1988 and 1990, the use rate increased as driver age increased. In 1989, young adults had the lowest use rate, and the other three age groups had similar use rates; the variation was only 1 percentage point. Except for preadults in 1990, driver belt use was greater in 1989 and 1990 than in 1987, pre-MUL.

RFP belt use was also categorized by age. Infant use increased from 58.8% pre-MUL to 67.0%, 82.9%, and 88.2% post-MUL. Preadult RFP belt use was 36.9% in 1987, 59.6% in 1988, 46.0% in 1989, and 51.3% in 1990. 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 and to 43.3% in 1990. Over the 4 years, RFP belt use by middle adults was 27.2%, 54.8%, 47.9%, and 49.8%. 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. Pre-MUL, 30.2% of the older adult RFPs were belt users; the use rates were 60.9% in 1988, 55.4% in 1989, and 53.6% in 1990. RFP use rates were higher in every age group in 1990 than they were pre-MUL. In general, RFP belt use was lower than for drivers each year for all age classifications, with three exceptions: older adults in 1987 and preadults in 1988 and 1990.

Table 13
BELT USE BY AGE OF OCCUPANT: STATEWIDE

Occupant Seat Position	Age of Occupant	PRE-MUL		1988		POST-MUL		1990	
		1987		1989		1989		1990	
		Number	%	Number	%	Number	%	Number	%
Driver	Preadult	28	40.0	22	45.8	25	58.1	2	25.0
	Young adult	1,155	37.0	1,875	62.5	1,695	55.3	1,761	56.8
	Middle adult	1,400	33.8	3,532	66.3	3,419	58.9	4,395	60.0
	Older adult	374	29.0	881	70.3	626	59.1	320	68.1
Right front passenger	Infant	50	58.8	59	67.0	63	82.9	60	88.2
	Preadult	196	36.9	289	59.6	242	46.0	294	51.3
	Young adult	218	26.0	402	52.0	362	43.8	355	43.3
	Middle adult	214	27.2	552	54.8	534	47.9	717	49.8
Older adult	160	30.2	321	60.9	241	55.4	125	53.6	
Remaining passengers	Infant	128	40.3	217	54.9	172	64.2	129	77.7
	Preadult	235	27.7	211	28.4	186	21.3	173	21.8
	Young adult	17	11.3	13	6.3	17	9.6	12	6.3
	Middle adult	9	8.0	28	14.9	25	15.6	40	15.9
Older adult	17	11.3	13	6.3	17	9.6	12	6.3	

When RP belt use was categorized by age, the data were variable. Infant use rose from 40.3% pre-MUL to 54.9% in 1988, 64.2% in 1989, and 77.7% in 1990. Preadult RP belt use was 27.7% in 1987, 28.4% in 1988, 21.3% in 1989, and 21.8% in 1990. No yearly use rate for young, middle, or older adult RPs exceeded 16% of those surveyed, and for the most part, fewer than 10% of those surveyed used a belt. All 4 years, RP belt use was lower than for drivers and RFPs in every age classification.

By Daily Time Period

Table 14 shows statewide belt use rates by daily time period. Just over 33% of the drivers used a belt in 1987, and the rates throughout the day varied by only 2.0 percentage points. In 1988, nearly 66% of the drivers used belts, and the rates varied by 3.7 percentage points. In 1989, over 55% of the drivers used belts, and the variation in use was 3.1 percentage points. In 1990, nearly 60% of the drivers used a belt, and there was a 4.6 percentage point range in rates. On a longitudinal basis, these data show a peak in use in the period 6 months post-MUL and a rate in 1989 and 1990 lower than the peak rate but 1.7 times greater than that pre-MUL. The data also show that belt use at mid-day is more divergent than the rates in the morning and afternoon in 1990 than previously.

The RFP use rates were lower than those for drivers, and there was less variability in use throughout the day. The rates varied by 1.0 percentage point in 1987, 1.5 points in 1988, 4.7 points in 1989, and 3.0 points in 1990. Fewer than 31% of RFPs used belts pre-MUL. Over 55% of RFPs used belts during each daily time period in 1988. In 1989, fewer than 50% of RFPs were belt users in the morning and afternoon and just over 50% in the mid-day period. In 1990, less than 50% of the RFPs used belts in the morning and at mid-day, and just over 50% did so in the afternoon. Although RFP belt use rates in 1989 and 1990 were lower than those in 1988, they were more than 1.5 times the rates in 1987, pre-MUL.

Use rates by RPs were lower than for drivers and RFPs during each survey time period all 4 years. In addition, RP use rates throughout the day varied by 3.0 percentage points in 1987, 2.2 points in 1988, 3.5 points in 1989, and 7.6 points in 1990. Just over 25% of RPs used 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. In 1990, RP use rates were higher in the morning, lower at mid-day, and nearly the same in the afternoon as rates observed in 1989.

Summary

The statewide findings can be summarized as follows:

1. There was a sharp and significant increase in statewide belt use by drivers and RFPs between 1987 and 1988.

Table 14
 BELT USE BY DAILY TIME PERIOD: STATEWIDE

Occupant Seat Position	Time Period	PRE-MUL			POST-MUL				
		1987		1988		1989			
		Number	%	Number	%	Number	%		
Driver	A.M.	960	34.0	2,030	67.3	1,799	58.1	1,995	60.9
	Mid.	935	33.4	1,960	63.6	1,875	56.1	2,061	56.4
	P.M.	1,062	35.4	2,320	65.8	2,091	59.2	2,422	61.0
Right front passenger	A.M.	224	30.8	369	57.5	307	45.8	317	49.5
	Mid.	291	30.3	573	56.0	533	50.5	557	47.9
	P.M.	323	29.8	681	56.0	602	48.0	677	50.9
Remaining passengers	A.M.	99	25.4	88	30.8	75	28.0	71	31.1
	Mid.	157	28.3	190	30.9	167	27.8	125	23.5
	P.M.	150	25.3	206	28.7	168	24.5	171	24.7

2. By 1989 and 1990, belt use rates for drivers and RFPs were significantly lower ($p < .01$) than the 1988 peak rates but were higher than the pre-MUL rates.
3. Belt use by RP occupants was significantly lower in 1989 and 1990 ($p < .02$) than in 1988. The rate in the past 2 years was also lower than the pre-MUL rate.
4. A large proportion of the child safety seats were incorrectly used.
5. Each year, female drivers and RFPs had higher use rates than did males.
6. There was little difference within or between years in male and female RP use of belts.
7. In the 3 post-MUL surveys, the highest driver use rate was for older adults.
8. All 4 years, the highest use rate was for infants.
9. There was little difference in driver and 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 15 through 17. Table 15 summarizes urban use rates, Table 16 summarizes town use rates, and Table 17 summarizes the combined urban and town use rates that are considered statewide rates.

The major study findings are as follows:

1. There were gradual increases in urban belt use by drivers and passengers from 1985 through 1987, a sharp increase in 1988, a significant decline ($p < .01$) in 1989, and a nonsignificant rise of less than 1.5 percentage points in 1990 (see Figure 2).
2. Post-MUL, young adults in the urban areas had belt use rates lower than those for middle and older adults (see Figure 3).
3. Except for 1987, over 66% of infants in urban areas used safety seats (see Figure 3).
4. Urban use rates were generally highest in the northern and lowest in the western areas of the state (see Figure 4).
5. Town data show a sharp rise in belt use by drivers and passengers in the first year post-MUL, followed by a significant decline ($p < .01$) in use rates in 1989 and little change in the use rates in 1990 (see Figure 5).

Table 15
SUMMARY: URBAN USE RATES

	PRE-MUL			POST-MUL		
	1985	1986	1987	1988	1989	1990
Total cars	5,436	6,155	6,020	7,137	7,285	8,400
Total persons	8,135	9,235	9,022	10,331	10,385	11,724
Total belt use	27.5%	34.7%	37.9%	63.3%	56.1%	57.6%
Driver belt use	28.4%	35.5%	40.4%	68.9%	61.0%	62.4%
Passenger belt use	25.7%	33.1%	32.9%	50.8%	44.7%	45.4%
Male use	26.9%	32.6%	34.7%	58.4%	52.5%	53.0%
Female use	28.0%	36.6%	40.6%	67.4%	61.8%	61.5%
Morning	30.7%	36.4%	38.0%	66.4%	59.4%	61.4%
Mid-day	27.0%	34.0%	38.6%	61.7%	55.8%	55.3%
Afternoon	25.6%	34.2%	37.2%	62.3%	54.0%	56.8%
Infant use	66.8%	69.3%	43.9%	66.2%	71.6%	82.7%
Preadult use	25.1%	34.7%	37.4%	45.9%	34.5%	37.1%
Young adult use	24.6%	31.7%	38.6%	60.6%	55.8%	54.8%
Middle adult use	28.4%	36.2%	38.6%	66.4%	61.4%	60.4%
Older adult use	19.1%	30.4%	33.6%	68.6%	60.4%	64.1%
Western	23.2%	27.0%	28.5%	61.0%	50.1%	53.3%
Northern	33.0%	45.2%	46.8%	63.7%	58.8%	61.8%
Central	24.4%	28.6%	35.9%	68.6%	57.4%	57.0%
Eastern	27.1%	33.3%	35.7%	60.3%	56.4%	55.8%

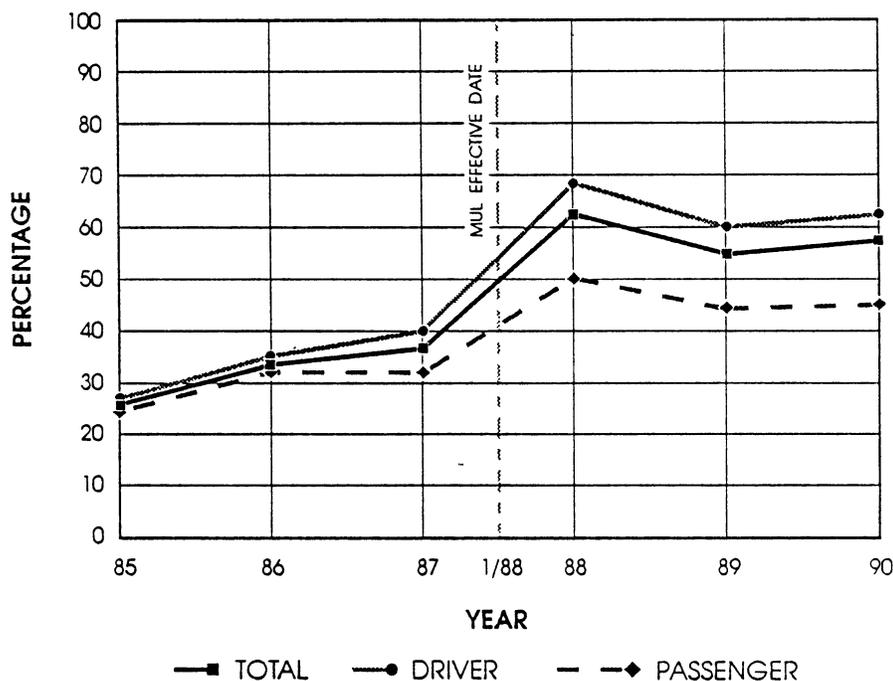


Figure 2. Urban Belt Use by Seat Position of Occupant.

Table 16
SUMMARY: TOWN USE RATES

	PRE-MUL	POST-MUL		
	1987	1988	1989	1990
Total cars	2,605	2,491	2,688	2,499
Total persons	3,913	3,797	4,084	3,757
Total belt use	19.9%	49.4%	43.8%	43.9%
Driver belt use	20.2%	55.8%	49.1%	49.6%
Passenger belt use	19.5%	37.1%	33.5%	32.4%
Male use	18.8%	42.6%	37.9%	39.6%
Female use	20.8%	54.7%	48.1%	47.4%
Morning	16.0%	51.6%	41.5%	42.9%
Mid-day	19.0%	48.5%	40.9%	39.5%
Afternoon	23.4%	48.8%	47.9%	48.2%
Infant use	45.1%	33.6%	58.6%	74.5%
Preadult use	19.6%	31.8%	26.6%	28.0%
Young adult use	21.6%	47.9%	41.8%	41.3%
Middle adult use	17.7%	52.9%	47.9%	47.2%
Older adult use	18.6%	58.4%	48.5%	46.2%
Western Valley	19.2%	53.3%	48.4%	48.2%
Southside	25.7%	52.2%	47.7%	51.2%
Southside	16.0%	43.2%	36.5%	34.8%

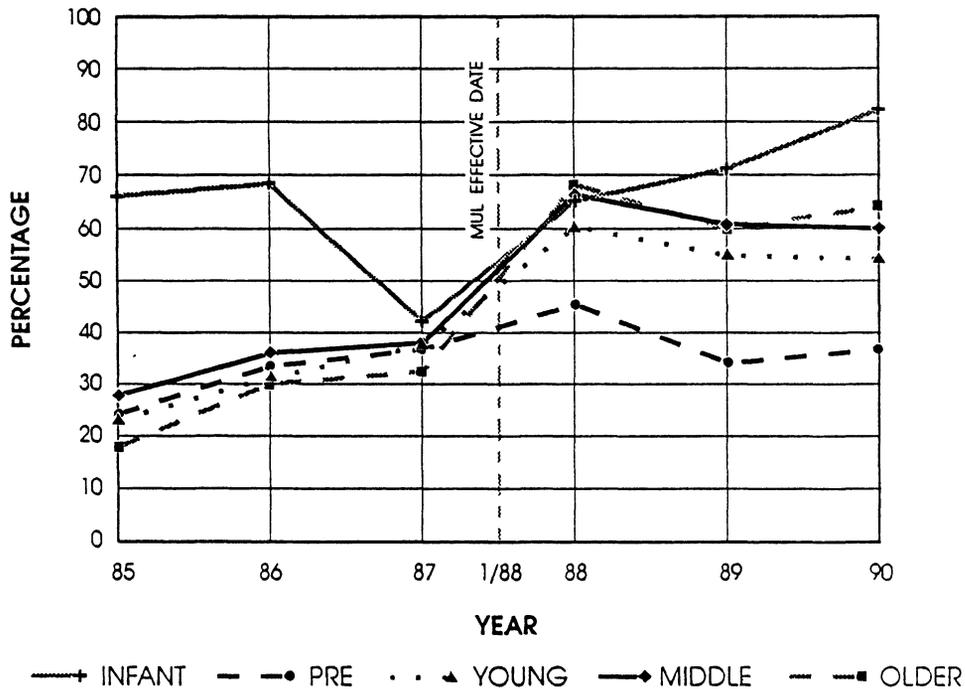


Figure 3. Urban Belt Use by Age of Occupant.

Table 17
SUMMARY: STATEWIDE USE RATES

	PRE-MUL	POST-MUL		
	1987	1988	1989	1990
Total cars	8,625	9,628	9,973	10,899
Total persons	12,935	14,128	14,469	15,481
Total belt use	32.5%	59.6%	52.6%	54.2%
Driver belt use	34.3%	65.5%	57.8%	59.4%
Passenger belt use	28.9%	46.8%	41.2%	41.9%
Male use	30.1%	54.3%	48.5%	49.8%
Female use	34.5%	64.0%	57.5%	58.0%
Morning	32.5%	63.0%	54.6%	57.5%
Mid-day	32.1%	57.7%	51.5%	51.3%
Afternoon	32.8%	58.7%	52.3%	54.6%
Infant use	44.2%	57.1%	68.3%	80.8%
Preadult use	31.7%	40.9%	31.5%	34.1%
Young adult use	33.8%	57.5%	52.2%	51.8%
Middle adult use	32.2%	63.0%	57.6%	57.2%
Older adult use	28.6%	65.2%	56.7%	61.0%

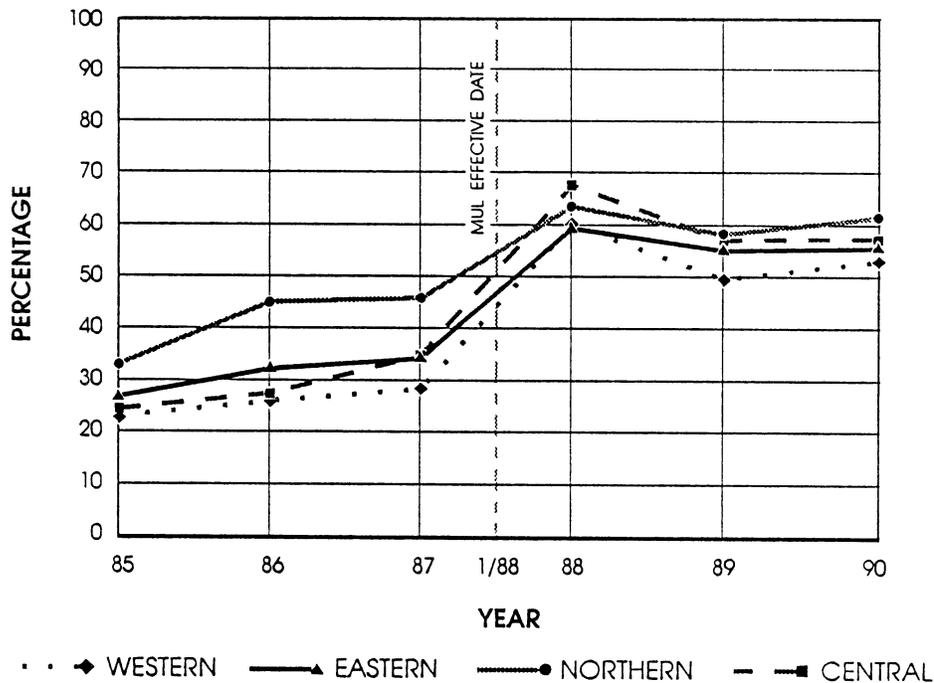


Figure 4. Urban Belt Use by Area of the State.

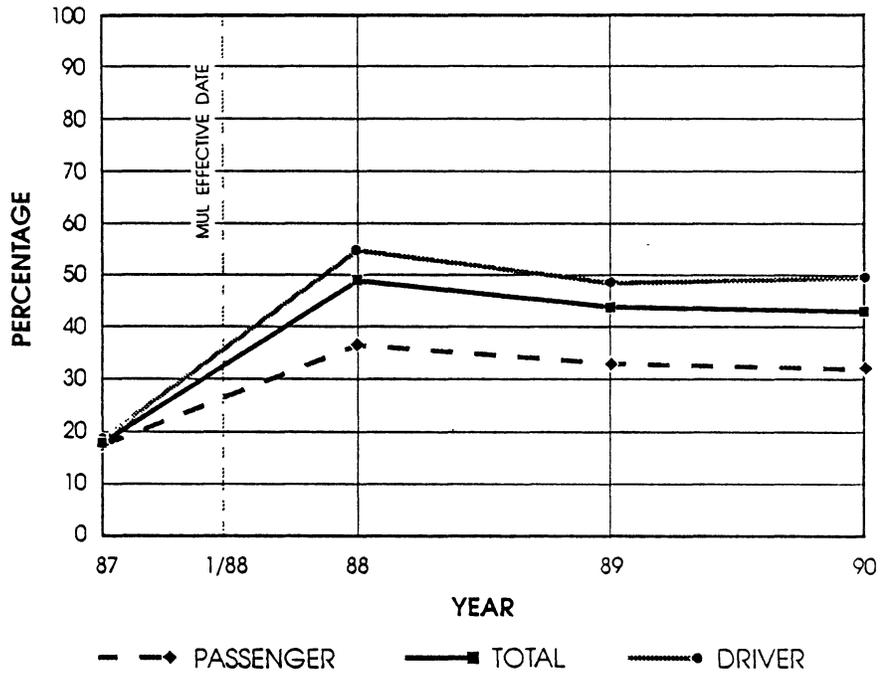


Figure 5. Town Belt Use by Seat Position of Occupant.

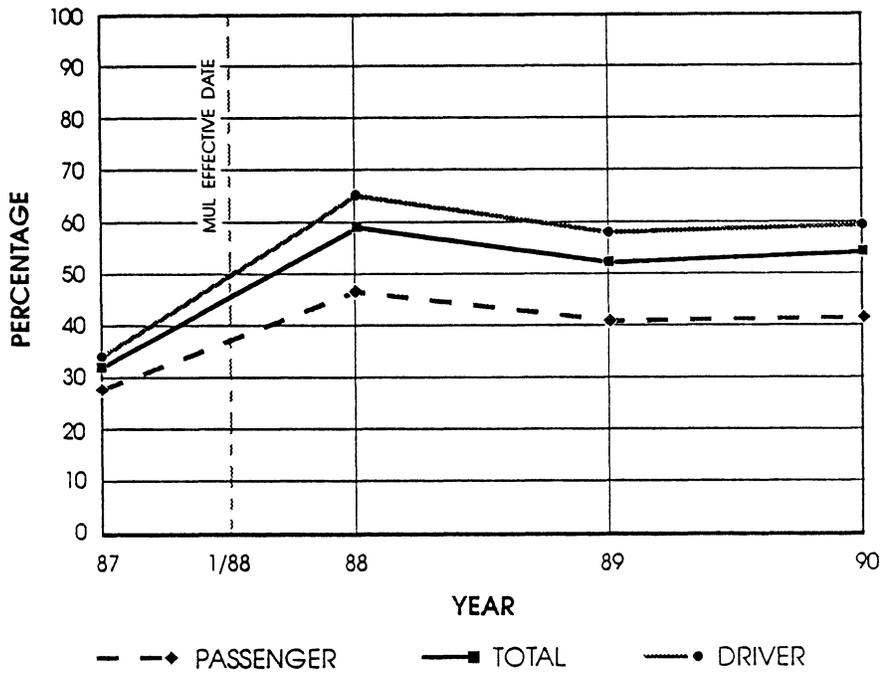


Figure 6. Statewide Belt Use by Seat Position of Occupant.

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 belt use rates by drivers and passengers between 1987 and 1988, followed by a significant decline ($p < .01$) in 1989 and a nonsignificant rise in 1990 (see Figure 6).
8. Belt use by remaining passengers (mainly rear seat occupants) was significantly lower ($p < .01$) post-MUL than pre-MUL.
9. Each year, a large proportion of the child safety seats were obviously misused.
10. There was little difference in 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 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 can be attributed to the implementation of the MUL on January 1, 1988. The drop in use in 1989 was not unexpected in that nearly every jurisdiction that has passed an MUL has experienced a rapid rise in use followed by a decline. Reasons typically cited for this decline involve reductions in the enforcement effort and in public information activity. The minor change in use rates in 1990 is also consistent with the pattern found by other states. In the absence of special activities or changes in the statute, there should be little change, either up or down, in succeeding surveys.
2. The high rate of child safety seat use is attributable to the passage of the child safety seat law in 1982. Prior to 1983, fewer than 20% of the infants in surveyed automobiles were restrained in a safety seat. Subsequent to the effective date of the statute, at least 66% of observed infants were in a child safety seat except in 1987, and the rate remained relatively stable over the first 4 years before increasing in each of the past 2 years. The low rate of *correct* child seat use in 1987 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 in 1985 and 1986. 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 1990 was the highest of any year the data have been collected. Although the rate of obvious incorrect use has apparently declined, it is apparent that additional work is necessary to educate parents in the proper installation of a child safety seat and in the correct placement of their child in the seat itself.

3. There was a considerable difference between the belt use rates in the urban areas and in the towns, with the urban rates being much higher. There were also large differences in the rates within the four urban areas and among the towns surveyed. 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 belt use throughout the state.
4. Use rates for RP occupants were much lower than use rates for drivers and RFPs.
5. The consistency of belt use throughout the day for each of the occupant seat positions is a positive sign for the conduct of observational surveys of 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. Public education and enforcement efforts to bolster belt use in Virginia should be directed to the following:
 - residents of towns and rural areas
 - occupants of the rear seat positions of automobiles
 - males 17 through 30 years of age
 - areas of the state in which use rates have declined to or have remained below 50%
 - periods when motor vehicle occupants are traveling to and from work.
2. The Virginia General Assembly should amend the MUL to include rear seat occupants.

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