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Child Safety Seat and Safety Belt Use Among Urban Travelers: Results of the 1983-1986 Surveys

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Abstract

The four major metropolitan areas of Virginia were surveyed to determine the extent to which safety restraints were being used by urban travelers. Observers were stationed at selected signalized intersections and displayed to stopped motorists a clipboard bearing the question "Are you wearing safety belts?" The observers then approached the vehicles to visually verify any response given and to record whether safety belts or child safety seats were being used. They also recorded the sex and approximate age of each occupant and whether the child safety seats were being correctly or incorrectly used. These observations occurred in two series: 1) 1974-1977 and 2) 1983-1986. Only the latter data are reported here.

Four characteristics of the survey sample were analyzed to determine whether they biased the observed belt use results. The number of vehicles observed during each of the three daily periods and in the four areas of the state and the sex of the observed occupants occurred in similar proportions in each of the four surveys and should not have caused year-to-year differences in belt usage. There were, however, variations in the age distributions of the vehicle occupants in the four survey samples, and these differences (more older and fewer middle adults) should have resulted in slightly lower use rates in 1986, all other influences being the same.

Observed belt usages were analyzed according to a number of vehicle, occupant, and geographic characteristics. Each of these is discussed in a separate section of the report. Belt use rates were higher in 1986 than during the previous four years, with 35.5% of the drivers and 33.1% of all passengers using some form of safety restraint. The passage of the Child Safety Seat law in 1982 resulted in a significant increase in usage by passengers less than four years of age. During all four years, nearly three-fourths of the infants traveling as right front passengers and two-thirds of the infants classified as remaining passengers were observed to be in safety restraints.

CHILD SAFETY SEAT AND SAFETY BELT USE AMONG URBAN TRAVELERS

Results of the 1983 - 1986 Surveys

by

Charles B. Stoke
Research Scientist

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

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SUMMARY OF FINDINGS

1. Similar proportions of survey data were collected each year relative to the time of day, area of the state, and sex of the occupant. Variations in these data should not influence statewide safety belt usage rates (see Tables 1, 2, and 3).

2. Over the four years, there were variations in the age distributions of drivers and passengers. In 1986, there were more older and fewer middle adults in the survey sample. These variations alone should result in a slightly lower use of safety belts in 1986 than in previous years (see Table 4).

3. The percentage of drivers and right front passengers (RFP's) using safety belts increased each year from 1983 to 1986 (see Table 5).

4. Use of the lap/shoulder combination accounted for nearly all of this belt usage (see Table 5).

5. In 1986, 10.8% (4 of 37) of all RFP child seats were obviously misused (see Table 5).

6. The percentage of all remaining passengers (RP's) using safety restraints increased each year from 1983 to 1986 (see Table 5).

7. Use of child safety seats and lap belts accounted for most of the belt usage by RP's (see Table 5).

8. In 1986, 16.7% (27 of 162) of all RP child seats were obviously misused (see Table 5).

9. There was a positive association between driver and passenger use of safety belts. If one used safety belts, there was an increased tendency for the others to use them (see Table 6).

10. When there was an infant in the car using a child safety seat, there was an increased percentage of other occupants using safety restraints (see Table 7).

11. A slightly greater percentage of female drivers and RFP's used safety belts than did their male counterparts (see Table 8).

12. The usage rates for male RP's was higher than those for female RP's (see Table 8).

13. In 1985 and 1986, belt use by drivers and passengers was greatest in the morning; in 1983 and 1984, passenger use rates were highest in the morning and driver rates were highest in the afternoon (see Table 9).

14. In each driver age category, safety belt use was higher in each successive year of the survey (see Table 10).

15. Over three-fourths of the infant RFP's and two-thirds of the infant RP's were in safety restraints (see Table 10).

16. For occupants other than infants, belt use was highest for middle adult drivers and pre-adult passengers (see Table 10).

17. Belt use was highest in the northern area and lowest in the western area of the state (see Table 11).

Exhibit 1

SAFETY BELT USE

Summary of Results

	1983	1984	1985	1986
Total Cars	6,495	5,858	5,436	6,155
Total Persons	9,732	8,981	8,135	9,235
Total Belt Use	17.3%	20.1%	27.5%	34.7%
Driver Belt Use	16.4%	20.5%	28.4%	35.5%
Passenger Belt Use	19.0%	19.4%	25.7%	33.1%
Male Use	17.2%	19.6%	26.9%	32.6%
Female Use	19.3%	20.7%	28.0%	36.6%
Morning	18.4%	22.0%	30.7%	36.4%
Mid-Day	15.4%	17.9%	27.0%	34.0%
Afternoon	18.3%	21.1%	25.6%	34.2%
Infant Use	68.2%	68.7%	66.8%	69.3%
Pre-Adult Use	17.9%	20.5%	25.1%	34.7%
Young Adult Use	12.7%	19.7%	24.6%	31.7%
Middle Adult Use	16.4%	18.6%	28.4%	36.2%
Older Adult Use	14.7%	14.5%	19.1%	30.4%
Western Use	13.2%	15.9%	23.2%	27.0%
Northern Use	22.2%	25.5%	33.0%	45.2%
Central Use	15.3%	16.5%	24.4%	28.6%
Eastern Use	16.2%	20.1%	27.1%	33.3%

CONCLUSION

Based on the analysis of the data collected during each of the surveys reported here, it was concluded that passage of the Child Safety Seat Law by the Virginia General Assembly has had a continuing major positive influence on the use of safety restraints by infants. It is further concluded that a number of other factors have combined to raise safety belt usage by other vehicle occupants, and that these voluntary rates, 35.5% of all drivers and 33.1% of all passengers, have approached levels comparable to usage rates in states with mandatory usage laws.

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INTRODUCTION

There is a great body of literature detailing the advantages of safety belt use by motor vehicle occupants. This literature cites the probability of reducing injuries, including fatal injuries, and projects the value of this reduction to the individual and to society in general. This evidence of injury avoidance and economic savings is so strong that for over twenty years both federal and state governments have required the installation of safety belts in all new automobiles offered for sale. It is equally well known that making safety belts available does not assure their use.

Numerous efforts have been initiated by government agencies and private groups to persuade motorists to use restraining devices. There have been many public information and education campaigns using both the print and electronic media and star personalities, as well as offers of prizes of greatly differing values, to increase safety belt usage. The public is also familiar with various engineering approaches, such as the installation of warning buzzers and lights, interlock systems, three-point belts, and inertial reels, to promote the use of restraints. All fifty states require the use of child safety seats, although there are variations among the statutes, and twenty-five states, as of July 1986, had various mandatory use laws applicable to other vehicle occupants.

Legislation that would require the use of safety belts by drivers and front seat occupants was introduced during the 1984, 1985, and 1986 sessions of the Virginia General Assembly. A bill has been closer to passage during each successive year. In 1984, a bill failed in the House. In 1985, it passed in the House, but not in the Senate. In 1986, both legislative bodies initially passed a mandatory use law, but there were variations in the House and Senate versions. As with all legislation, these differences were worked out by a conference committee and the compromise bill went to a vote in both houses during the final days of the session. It passed in the House and initially passed in the Senate, but upon a Senate call for reconsideration, it failed on a tie vote. This chronology shows just how close a mandatory usage law was to being enacted in Virginia in 1986. The bill's sponsor has indicated

that he will reintroduce a mandatory safety belt use statute in the 1987 session and hopes that he will be successful in having it enacted.

There have been a number of investigations to determine the extent to which motor vehicle occupants use safety belts. Some investigators have used questionnaire and interview formats, while others have used a variety of observational techniques. It has been found that motorists responding to questions on their use of safety belts have generally given the socially acceptable affirmative reply. Observations have shown, however, that actual belt use is less than that stated.

Over the last five years, there have been a number of events that could have influenced the rate of safety belt usage in Virginia. In 1982, the General Assembly passed a statute requiring children younger than four years of age to be restrained in child safety seats. This law became effective January 1, 1983. Also, there have been major changes in the size, weight, and design of vehicles, both domestic and imported, that should affect safety belt use. In addition, there is the possibility that efforts to promote safety consciousness over the intervening years have produced an increase in the use of safety belts. Finally, publicity on the efforts to enact a mandatory safety belt statute in Virginia may have led some citizens to alter their belt use patterns.

PURPOSE

This study has two purposes: 1) to determine the extent to which the law mandating the use of child safety seats has affected usage rates, and 2) to determine the extent of safety belt usage by all other vehicle occupants.

SURVEY METHODOLOGY

In June of 1983, 1984, 1985, and 1986, observers surveyed vehicle occupants in four metropolitan areas of the state; namely, Western Virginia (Roanoke-Salem-Vinton), Northern Virginia (Alexandria-Arlington-Fairfax County-Belvoir), Central Virginia (Richmond-Henrico-Chesterfield), and Eastern Virginia (Norfolk-Virginia Beach-Hampton). These observations began on Thursday morning, and except for a travel day on Saturday of the first week, continued straight through for ten days ending on Saturday of the second week. This procedure resulted in nine days of data collection.

Three sites located in different sections of the survey areas were used each day. They were chosen because they carried relatively high

traffic volumes and provided adequate and safe vantage points for observations. Each day 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. Three time periods were used: 1) 8:00 a.m. to 10:30 a.m., 2) 11:30 a.m. to 2:00 p.m., and 3) 3:30 p.m. to 6:00 p.m.

The observations were made at signalized intersections, and 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 from the front at a 45° angle. Approaching at the right front fender, the observer walked along the side and past the vehicle while noting and 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 vehicles were 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 the lap and shoulder belts, or no form of restraint. In addition, they recorded whether there were any infants in the car and whether they were in safety seats. In previous years any incorrect child seat use was recorded as not used. For 1986, however, 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 a restraint not being used (the "N" answer). 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 old), 2) pre-adults (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). Figure 1 is a copy of the data collection form used for the 1986 survey.

The 1986 survey was the eighth to be conducted and the fifth during summer months, the first three having been conducted during February. The surveys were originally designed to determine whether there were fluctuations over time in the percentages of persons using seat belts and shoulder straps. The fourth, conducted during June 1977, was the first to include observations on the use of child restraints. This information on child restraint usage was added at the request of the director of the Highway Safety Division. After the 1977 survey, it was determined that yearly updates were not necessary and that surveys would be conducted following events expected to change the pattern of safety belt usage. The first significant event to occur after the 1977

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.)

survey was passage of the Child Safety Seat Law (Senate Bill 413) during the 1982 session of the Virginia General Assembly. This statute went into effect January 1, 1983. Therefore, during June 1983 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. A year later, data were collected during the summer of 1984 in an effort to determine whether there had been changes in belt use patterns by vehicle occupants. Because of the publicity associated with the bill to require front seat occupants to use safety belts, and the statement by a member of the House of Delegates that a bill would be reintroduced during each successive session until it passed, Department of Motor Vehicle officials decided to conduct yearly surveys to update the baseline data. These data are to be used in determining the effectiveness of the statute in changing belt use patterns once it became law.

ANALYSIS

The survey data in this report are discussed in two stages. First, time period, location, and occupant characteristics are analyzed to determine whether they contributed to changes in belt use patterns over the 1983-1986 period. Second, data on the observed belt usage in each year are analyzed and changes in the use patterns are discussed.

The Survey Sample

During the nine day survey period in June 1983, data were collected on 9,737 occupants of 6,498 vehicles. There were 8,981 occupants in 5,581 vehicles in 1984, 8,135 occupants in 5,436 vehicles in 1985, and 9,235 occupants in 6,155 vehicles in 1986. Data on the number and percentages of individuals surveyed by daily time period, area of the state, sex of the occupant, and age of the occupant are presented in Tables 1 through 4.

The number and percentage of vehicles surveyed during each of the daily time periods are contained in Table 1. For each year of data presented in this report, the greatest percentage of vehicles was observed during the afternoon (3:30 to 6:00 p.m.) and the smallest percentage was during the morning (8:00 to 10:30 a.m.). Since 1983, there has been a narrowing of the variation in the percentages of vehicles surveyed during each observation period. The percentages for 1983 and 1984 were nearly identical (26.8% vs. 27.2% in the morning, 34.3% vs. 34.0% at midday, and 38.9% vs. 38.8% in the afternoon), and those for 1985 (30.6%, 32.5%, and 36.9%) and 1986 (31.3%, 31.4%, and 37.3%) were very similar, but varied from those of the two previous

Table 1

Time Period Data

Time Period	1983 Number	1983 % of Total	1984 Number	1984 % of Total	1985 Number	1985 % of Total	1986 Number	1986 % of Total
Morning	1,739	26.8	1,596	27.2	1,665	30.6	1,927	31.3
Midday	2,229	34.3	1,991	34.0	1,766	32.5	1,932	31.4
Afternoon	2,530	38.9	2,272	38.8	2,005	36.9	2,296	37.3

Table 2

Location Data

Location	1983 Number	1983 % of Total	1984 Number	1984 % of Total	1985 Number	1985 % of Total	1986 Number	1986 % of Total
Western	1,307	20.1	1,414	24.1	1,177	21.7	1,404	22.8
Northern	2,067	31.8	1,850	31.6	1,765	32.5	2,039	33.1
Central	1,670	25.7	1,399	23.9	1,350	24.8	1,380	22.4
Eastern	1,454	22.4	1,196	20.4	1,144	21.0	1,332	21.6

years. These small differences in the distributions of vehicles surveyed by time of day over the 1983 to 1986 period should not affect year-to-year belt use patterns by drivers or passengers.

Table 2 contains data on the number and percentage of vehicles surveyed in each of the four areas of the state. The observers worked three days in the northern area, including a Sunday with its lower traffic volumes, and two days in each of the other three geographic areas. There has been some variation in the percentages of vehicles surveyed in each of the four geographic areas over the four years of data discussed here. The greatest year-to-year difference was four percentage points in the western area between the 1983 (20.1%) and the 1984 (24.1%) data. Central area data were the second most divergent, varying by a maximum of 3.3 points; 25.7% in 1983 and 22.4% in 1986. In the northern area, the percentages varied by less than 1.5 points over the four years, with the smallest percentage surveyed in 1984 (31.6%) and the greatest in 1986 (33.1%). The percentages of vehicles surveyed in the eastern area were nearly as stable as those in the northern area, varying by only two points over the four years; 20.4% in 1984 to 22.4% in 1983. For 1985 and 1986, the distributions approximated an equal 11.1% distribution for each survey day in each area. Because of the general consistency in the percentages of vehicles surveyed in the four geographic areas of the state over these four years of the project, it is unlikely that any variations in this factor would bias observed belt use patterns.

The data on the sex of the occupants are presented in Table 3. The ratios of male to female drivers and right front passengers (RFP's) were nearly the same for 1983, 1985, and 1986. The figures for 1984 varied by just over two percentage points in each instance. For the four years covered in this report, over half of the drivers were males, more than two-thirds of the RFP's were females, and nearly 60% of the remaining passengers (RP's) were females. Differences in the year-to-year percentages are so slight that they should not influence statewide driver and passenger belt use patterns.

Table 4 contains data on the ages of the occupants surveyed. There were some differences in the age distributions of drivers over the four survey periods. Although middle adults accounted for most of the observed drivers, the percentages varied from 69.0% in 1983 to 53.6% in 1986. The year-to-year proportions of young adult drivers varied inversely to those for middle adults,but generally accounted for under 30% of all drivers. There was a steady increase in the proportion of older adult drivers; the percentage of drivers over 60 rose from 3.5% in 1983 to 16.8% in 1986. Because older adults are less likely to wear safety belts, and because the percentage of older drivers increased relative to the percentage of middle adults, statewide driver belt usage would be expected to decline between 1983 and 1986.

Table 3

Sex of Occupant Data

Occupant Seat Position	Sex of Occupant	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Female	3,034	46.7	2,577	44.0	2,585	47.6	2,944	47.8
	Male	3,464	53.3	3,282	56.0	2,851	52.4	3,211	52.2
Right Front Passenger	Female	1,377	67.8	1,302	65.6	1,151	67.1	1,339	67.7
	Male	655	32.2	684	34.4	564	32.9	639	32.3
Remaining Passengers	Female	707	58.6	647	56.4	535	54.4	647	58.7
	Male	500	41.4	500	43.6	449	45.6	455	41.3

Table 4

Age of Occupant Data

Occupant Seat Position	Age of Occupant	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Pre-Adult	0	----	6	0.1	4	0.1	14	0.2
	Young Adult	1,785	27.5	2,041	34.8	1,553	28.6	1,807	29.4
	Middle Adult	4,486	69.0	3,253	55.5	3,313	60.9	3,301	53.6
	Older Adult	227	3.5	559	9.5	566	10.4	1,033	16.8
Right Front Passenger	Infant	50	2.5	42	2.1	55	3.2	44	2.2
	Pre-Adult	294	14.5	321	16.2	307	17.9	312	15.8
	Young Adult	547	26.9	585	29.5	419	24.4	503	25.4
	Middle Adult	981	48.3	789	39.7	694	40.5	679	34.3
	Older Adult	160	7.9	248	12.5	240	14.0	440	22.2
Remaining Passengers	Infant	286	23.7	210	18.3	225	22.9	200	18.1
	Pre-Adult	518	42.9	560	48.8	470	47.8	596	54.1
	Young Adult	190	15.7	160	13.9	110	11.2	124	11.3
	Middle Adult	173	14.3	151	13.2	135	13.7	103	9.3
	Older Adult	40	3.3	67	5.8	44	4.5	79	7.2

The distributions of RFP's surveyed over the four years fluctuated in nearly the same manner as those for drivers. The middle adult age group had the greatest proportion of RFP's and young adults made up the second largest RFP group each year. The percentages of three of the age classifications of RFP's observed over the 1983-1986 period remained relatively stable from year to year, as well as over the four year span. The percentage of infants varied by only one point and accounted for between 2% and 3% of all RFP's observed. The percentage of pre-adults varied by a maximum of 3.5 points and accounted for about 16% of the observed RFP's each year. The percentage of young adult RFP's varied by a maximum of four points and accounted for just under 27% of the sample each year. While there was relative stability in the above three age classifications, there were relatively large changes in the percentages of middle and older adult RFP's surveyed. Between 1983 and 1986, the proportion of middle adults declined from 48.3% to 34.3% and the proportion of older adults rose from 7.9% to 22.2%. These changes in the ages of the observed occupants lead one to expect a slight drop in RFP safety belt use rates over the four years.

There were also variations in the age distributions of the remaining passengers over the four surveys. At least two-thirds of the RP's surveyed each year were infants or pre-adults, groups that tend to have the highest usage rates. Of the remaining RP's, there was a decline in the proportion of young adults (15.7% to 11.3%) and middle adults (14.3% to 9.3%), and an increase in the older adult group (3.3%, to 7.2%). The expected results of these variations would be a slight increase in belt usage by the RP's across the years.

The discussion of the four characteristics of the survey sample suggests there is no single factor or combination of factors that should significantly bias the year-to-year belt use patterns by drivers, RFP's, or RP's. If changes in use patterns are discovered in the data analyzed in section two of this report, these differences would be the result of other factors, such as changes in state law, public information programs, news media reports of legislative action, or other undiscovered causes.

Observed Belt Use

At the outset, it should be noted that large percentage increases from year-to-year and over the four years are usually the result of small numerical increases in very small survey samples. The reader is cautioned to view large percentage rates of change in use patterns in light of the overall percent of use for the category under discussion.

The data in Table 5 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 using the various restraint devices as a function of all occupants in that position. Thus, the figures in Table 5 make it appear that the use of child restraints is very low, because these use rates are not restricted to those for occupants in the 0-4 age group. Subsequent tables in the report show age group usage rates.

There has been a significant increase in safety belt use by drivers during these four years of the survey. The use of lap belts has remained at a stable 2-3% over the period. Part of this stability is explained by the limited number of vehicles equipped with this belt system. Driver use of the lap/shoulder (L/S) system has increased from 14.4% in 1983 to 33.0% in 1986 (there was an increase in usage each year). In 1986, over 35% of all observed drivers were using some type of restraint system.

RFP belt use increased each year and most of this usage was accounted for by the use of L/S belt systems. There was an increase in L/S usage in each of the successive surveys, rising from 12.1% in 1983 to 26.5% in 1986, and in the use of the lap belt, from 2.5% to 4.0%. Correctly used child safety seats remained stable from year-to-year. Overall occupant restraint usage by RFP's was 16.3% in 1983 and 32.2% in 1986. This is a major gain in occupant protection and safety for these passengers.

For 1986, the data included a new usage classification, incorrectly used child seats. Because this was an in-traffic survey, the observation team could not and did not enter the vehicles to check for certain installation characteristics. Thus, only the most obviously misused systems could be identified. Four of the thirty-seven infants in child safety seats in the RFP seat position were determined to be incorrectly restrained. This is nearly an 11% misuse of child seats in the RFP seat position.

Belt usage by the remaining passengers (RP's) followed the same general trends seen for drivers and RFP's. Overall, usage was 24.6% in 1983 and increased each year to 34.8% in 1986. Use of the L/S system was relatively low and remained stable because only a few vehicle models have these belt systems installed for RP's. The use of lap belts was 6.8% in 1983 and 20.3% in 1986. This increase was accompanied by a slight drop in correctly used child seats, from 15.7% in 1983 to 12.3% in 1986. Twenty-seven of the 162 infants in child safety seats were observed to be incorrectly restrained. While these twenty-seven accounted for only 2.4% of all RP's they made up nearly 17% of all infants in child seats.

Data collected during the four surveys show that safety belt usage has gone up each year for each seat position classification, and in 1986 over a third of all drivers and passengers were observed to be using safety restraints. This increase in usage in Virginia is consistent

Table 5

Use of Safety Belts

Occupant Seat Position	Restraint Use	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Lap Only	132	2.0	165	2.8	128	2.4	156	2.5
	Lap/Shoulder	936	14.4	1,030	17.7	1,415	26.0	2,033	33.0
	None	5,427	83.6	4,656	79.5	3,893	71.6	3,966	64.4
Right Front Passenger	Lap Only	51	2.5	59	3.0	64	3.7	80	4.0
	Lap/Shoulder	246	12.1	247	12.5	322	18.8	524	26.5
	Child "A"[1]	33	1.6	24	1.2	37	2.2	33	1.7
	Child "Z"[2]	N/A[3]	--	N/A	--	N/A	--	4	0.2
	None	1,700	83.7	1,653	83.4	1,292	75.3	1,337	67.6
Remaining Passengers	Lap Only	82	6.8	139	12.1	108	11.0	224	20.3
	Lap/Shoulder	13	1.1	7	0.6	20	2.0	24	2.2
	Child "A"	190	15.7	131	11.4	142	14.4	135	12.3
	Child "Z"	N/A	--	N/A	--	N/A	--	27	2.4
	None	922	76.4	870	75.9	714	72.6	692	62.8

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.

with data collected on a nationwide basis which also have shown increases in belt usage. In addition, Virginia's use rates are now beginning to approach the levels found in states with mandatory use laws.

The U.S. Department of Transportation's "19-City Safety Belt and Child Safety Seat Use Observation Survey" reported a driver use rate of 34.2% and a child safety seat use rate of 68.4% for the January - June 1986 period. These figures are nearly identical to those observed in Virginia and reported in this document. Eight of these nineteen cities were in states with mandatory safety belt use laws (MUL's) in effect.

In states with MUL's, belt usage varies from community to community within the state. Some states report their usage as a statewide figure and others report on a community basis. Use rates as reported in the "Status Report" of the Insurance Institute for Highway Safety, with the survey date in parentheses, include the following: 1) Nebraska (11/85) - 46%, 2) Michigan (4/86) - 44%, 3) Massachusetts (2/86) - 37%, 4) New Jersey (4/86) - 18% to 48%, 5) New York (6/86) - 32% to 62% (the highest rate was in Elmira, a community that has a special belt use enforcement activity in progress), 6) California (7/86) - 26% to 42%, and 7) Illinois (7/86) - 21% to 42%. As can be seen from these data, voluntary use rates in Virginia are not dissimilar from the rates in several of these MUL states, and, in fact, are more similar to the data from states that have had their law in effect for the longest period of time.

Data on the association between driver and passenger uses of safety belts are contained in Table 6. The survey results from all four years indicate that when the driver was not using safety belts nearly all of the RFP's also were not using belt systems. While there were slight increases in belt usage each year from 1983 (5.5%) to 1986 (9.6%), the fact remains that over 90% of all the RFP's riding in cars with non-belted drivers were not using the available safety restraints. The belt use figures for RP's were slightly better than those for RFP's, but a large majority of these passengers also were not using safety belts when riding with non-belted drivers. The use rates remained at about 16% in 1983, 1984, and 1986. In 1985, only about 13% of the RP's were using safety belts. Each year, the most commonly used belt system was a properly used child seat which accounted for nearly 10% of the total usage in each of the last three years. This finding was not unexpected in light of the ages of persons observed in the various seating positions. What was surprising, however, was just how few RP's riding with non-belted drivers were using any form of safety restraint. Each year more than 83% of these passengers were not using belts. These figures are especially disappointing because the RP seat positions are those in which few adults but most children ride.

The data were also categorized according to RFP and RP belt use patterns when the driver was using a lap belt. If the driver was wearing only the shoulder strap portion of a L/S belt system, this was

Table 6

Association Between Driver and Passenger Uses of Safety Belts

Occupant Seat Position	Occupant Use of Belt	When Driver Not Using Belts							
		1983		1984		1985		1986	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Right Front Passenger Using	Lap Only	17	1.0	24	1.5	14	1.1	18	1.4
	Lap/Shoulder	50	3.0	55	3.4	60	4.7	98	7.4
	Child "A"	25	1.5	18	1.1	18	1.4	11	0.8
	Child "Z"	N/A	--	N/A	--	N/A	--	4	0.3
	None	1,598	94.6	1,528	94.0	1,176	92.7	1,187	90.1
Remaining Passenger Using	Lap Only	31	3.1	48	5.4	20	2.9	46	6.5
	Lap/Shoulder	3	0.3	1	0.1	6	0.9	2	0.3
	Child "A"	139	13.9	89	9.9	67	9.7	70	9.9
	Child "Z"	N/A	--	N/A	--	N/A	--	22	3.1
	None	830	82.8	760	84.6	600	86.6	569	80.3

Occupant Seat Position	Occupant Use of Belt	When Driver Using Lap Belt							
		1983		1984		1985		1986	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Right Front Passenger Using	Lap Only	25	67.6	21	55.3	14	42.4	22	52.4
	Lap/Shoulder	2	5.4	4	10.5	6	18.2	9	21.4
	Child "A"	0	0.0	3	7.9	2	6.1	0	0.0
	Child "Z"	N/A	--	N/A	--	N/A	--	0	0.0
	None	10	27.0	10	26.3	11	33.3	11	26.2
Remaining Passenger Using	Lap Only	8	32.0	14	53.8	14	50.0	12	48.0
	Lap/Shoulder	0	0.0	0	0.0	0	0.0	0	0.0
	Child "A"	4	16.0	0	0.0	5	17.9	4	16.0
	Child "Z"	N/A	--	N/A	--	N/A	--	0	0.0
	None	13	52.0	12	46.2	9	32.1	9	36.0

Table 6 (continued)

Association Between Driver and Passenger Uses of Safety Belts

Occupant Seat Position	Occupant Use of Belt	When Driver Using Lap & Shoulder Belts							
		1983		1984		1985		1986	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Right Front Passenger Using	Lap Only	9	3.0	14	4.4	36	8.7	40	6.5
	Lap/Shoulder	194	64.5	188	58.7	256	61.8	417	67.5
	Child "A"	8	2.7	3	0.9	17	4.1	22	3.6
	Child "Z"	N/A	--	N/A	--	N/A	--	0	0.0
	None	90	29.9	115	35.9	105	25.4	139	22.5
Remaining Passenger Using	Lap Only	43	24.2	77	34.5	74	28.1	166	45.1
	Lap/Shoulder	10	5.6	6	2.7	14	5.3	22	6.0
	Child "A"	46	25.8	42	18.8	70	26.6	61	16.6
	Child "Z"	N/A	--	N/A	--	N/A	--	5	1.4
	None	79	44.4	98	44.0	105	39.9	114	31.0

recorded as use of a lap belt. For the most part, cars equipped with only a lap belt for the driver had only a lap belt for the passengers. These vehicles make up a smaller portion of the total vehicle fleet each year because they are primarily represented by vehicles older than the 1973 model year. RFP use rates were nearly the same during 1983, 1984, and 1986. Just under three-fourths of these passengers were using a belt system during these surveys. In 1985, two-thirds of the observed RFP's in cars with lap belted drivers were using a restraint system. For these same drivers, RP use rates varied from 48% in 1983 to 67.9% in 1985, with the rates in 1985 and 1986 being very similar. Use of a lap belt accounted for most of the usage by both RFP's and RP's when riding in cars with lap belted drivers. While these RFP and RP use rates are relatively high, they, in fact, represent very few total occupants and have little effect on the overall statewide use patterns.

For the 1983-1986 period, when drivers were using the L/S belt system, belt use rates by RFP's were 70.1%, 64.1%, 74.6%, and 77.6%, and nearly all of this usage was accounted for by the passenger use of the L/S system. RP use of belt systems also increased each year over this four-year period. The rates were 55.6%, 56.0%, 60.1%, and 67.6%, with nearly all of the usage accounted for by the use of lap belts and child safety seats. For both RFP's and RP's, restraint system usage was greater in 1986 than in the three previous years.

The survey data presented in Table 6 indicate that when drivers were using safety belts a very large and significant proportion of the passengers were also using safety belt systems. Conversely, when drivers were not using a belt system, a very large and significant proportion of the passengers also were not using belt systems. These data do not show whether driver use caused passenger use or whether passenger use caused driver use, but they do 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 7 focus on the extent to which drivers and passengers used restraint systems when infants were in the vehicle. As previously noted, the 1986 survey had three passenger use classifications for infants: 1) an infant in a correctly used safety seat, 2) an infant in a child safety seat which was obviously incorreclty used (began in the 1986 survey), and 3) an infant in the car but not using restraints of any type.

When the infant occupant was correctly restrained in a child safety seat, there was an increased probability that other vehicle occupants were also using safety belt systems. Over the four survey periods, use rates for drivers were 25.1%, 30.8%, 52.4%, and 52.0%. Over this same period, belt usage rates for RFP's were 17.2%, 42.3%, 65.0%, and 62.1% and those for RP's were 23.1%, 81.1%, 77.3%, and 78.2%. For drivers, the significant increase in belt use patterns occurred after the 1984

Table 7

Belt Use of Other Occupants in Vehicles with Infant Passengers

When Infant Seats Were Correctly Used*

Use By Other Occupants	Belt Use	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Belted	51	25.1	44	30.8	86	52.4	79	52.0
	Not Belted	152	74.9	99	69.2	78	47.6	73	48.0
Right Front Passenger	Belted	16	17.2	41	42.3	76	65.0	64	62.1
	Not Belted	77	82.8	56	57.7	41	35.0	39	37.9
Remaining Passengers	Belted	18	23.1	146	81.1	170	77.3	154	78.2
	Not Belted	60	76.9	34	18.9	50	22.7	43	21.8

When Infant Seats Were Incorrectly Used*

Use By Other Occupants	Belt Use	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Belted							5	16.7
	Not Belted							25	83.3
Right Front Passenger	Belted							4	19.0
	Not Belted							17	91.0
Remaining Passengers	Belted							6	12.0
	Not Belted							44	88.0

DATA ON INCORRECT USE NOT COLLECTED DURING 1983, 1984, AND 1985 SURVEYS.

Table 7 (continued)

Belt Use of Other Occupants in Vehicles with Infant Passengers

Use By Other Occupants	Belt Use	When Infants Were Not Using Restraints* 1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Belted	5	4.6	10	11.6	13	15.7	1	2.8
	Not Belted	104	95.4	76	88.4	70	84.3	35	97.2
Right Front Passenger	Belted	9	9.8	12	16.0	8	11.6	0	0.0
	Not Belted	83	90.2	63	84.0	61	88.4	31	100.0
Remaining Passengers	Belted	16	8.7	20	15.8	6	4.4	0	0.0
	Not Belted	167	91.3	107	84.2	130	95.6	58	100.0

*During 1983, 1984, and 1985 surveys, incorrect use of child safety seats was recorded as not using.

survey, for RFP's and RP's, this change occurred after the 1983 survey. The results, therefore, can be ascribed to the passage of the Child Safety Seat Law.

The analysis of driver and passenger usage rates when the infant was incorrectly restrained provides an interesting contrast in usage rates. In 1986, 16.7% of the drivers, 19.0% of the RFP's, and 12.0% of the RP's were using safety devices when riding in cars with the infant incorrectly restrained in the safety seat. These rates are considerably lower than the use rates for the other occupants when the infant was correctly restrained, but considerably higher than the use rates for other occupants when the infant was not restrained. This illustrates a minimal spill-over effect of the Child Safety Seat Law which provides an opportunity for the state, through various media promotions, to educate parents and guardians in correct child seat usage. By so doing, the state can promote an increase in belt use by all other occupants.

If the infant occupant was not in a child safety seat, most of the drivers and passengers also were not using their available safety restraints. The non-use figures for drivers were 95.4%, 88.4%, 84.3%, and 97.2% for the 1983-1986 period. Even the highest usage rate, 15.7% in 1985, was significantly below the statewide driver use figures in each of the four survey periods. The non-use rates for RFP's were 90.2%, 84.0%, 88.4%, and 100.0%; and those for RP's were 91.3%, 84.2%, 95.6%, and 100.0%. As with drivers, the RFP and RP use rates for each year of data collection were below statewide usage rates for all passengers combined. It is apparent that when the adults in the car are not concerned that the infant occupant is safeguarded through the use of safety restraints, they are also less likely to protect themselves by wearing safety belts.

The data in Table 8 depict safety belt use according to the sex of the occupant. Belt usage increased for each succeeding year for both male and female drivers, female RFP's, and male RP's. The yearly increases for male RFP's and female RP's were interrupted by slightly lower rates in 1984. Belt use by male drivers increased from 15.5% in 1983 to 33.1% in 1986, a 114% increase in usage. Belt use by female drivers increased from 17.5% in 1983 to 38.2% in 1986, a 118% increase in usage. Each year, female drivers used safety belts at a higher rate than did males. The four-year rate of increase in usage was nearly the same for both male and female drivers.

Belt use by male and female RFP's was lower each year than that for drivers. Belt use by male RFP's increased from 15.0% in 1983 to 29.0% in 1986, a 93% increase. Belt use by female RFP's increased from 16.9% in 1983 to 33.8% in 1986, a 100% increase. Female RFP belt use rates were higher than those for males each year except for 1985 and the four-year rate of increase was slightly greater.

Table 8

Belt Use by Sex of Occupant

Occupant Seat Position	Sex of Occupant	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Male	538	15.5	638	19.5	752	26.4	1,064	33.1
	Female	530	17.5	565	21.9	791	30.6	1,125	38.2
Right Front Passenger	Male	98	15.0	97	14.2	143	25.4	185	29.0
	Female	232	16.9	233	17.9	280	24.3	452	33.8
Remaining Passengers	Male	120	24.0	139	27.8	143	31.8	157	34.5
	Female	165	23.4	138	21.3	127	23.7	226	34.9

Except for females in 1984, belt use rates by RP's were greater in each successive year. Male RP belt use increased from 24.0% in 1983 to 34.5% in 1986, a 44% increase. Female RP belt use increased from 23.4% in 1983 to 34.9% in 1986, a 49% increase. Female RP use rates were lower than those for males in 1984 and 1985 and nearly the same as those for males in 1983 and 1986. For this reason, the overall rate of increase for male and female RP's was nearly the same over the four-year survey period. By 1986, slightly over a third of all male and female drivers and passengers were using some form of safety restraint. This is a significant gain in usage from the data collected in 1983.

Data on safety belt usage by survey time period are contained in Table 9. As with the other variables, driver use rates were higher in each successive year. During any single year of the survey, driver use rates varied by fewer than four percentage points among the three time periods. In fact, by 1986, the variance by time period had decreased to less than two percentage points, indicating a relatively stable rate of use throughout the day. When the data were considered on a longitudinal basis, there were significant year-to-year increases during each time period from 1983 to 1986. During the 8:00 to 10:30 a.m. period, driver use rates increased from 16.5% in 1983 to 36.5% in 1986, a 121% increase. In the 11:30 a.m. to 2:00 p.m. survey period, driver use rates increased from 14.5% in 1983 to 35.6% in 1986, a 146% increase. In the 3:30 to 6:00 p.m. period, driver use rates increased from 18.1% in 1983 to 34.8% in 1986, a 92% increase. The data also show that there has been a shift in the use patterns over this four-year period. In 1983 and 1984, the use rates were highest in the afternoon period and lowest in the midday period, but in 1985 and 1986, they were highest in the morning and lowest in the afternoon.

When categorized according to survey time period, RFP belt use increased each year with the exception of the afternoon period in 1984. During the morning survey period, RFP belt use increased from 16.3% in 1983 to 33.4% in 1986, a 105% increase. For the midday period, the increase was from 15.0% in 1983 to 30.7% in 1986, a 105% increase; for the afternoon period, belt use increased from 17.3% in 1983 to 32.9% in 1986, a 90% rise in usage. As with drivers, these data show a positive, upward trend in belt use patterns. As also seen in the driver use data, RFP belt usage was relatively consistent across all three time periods during any single year, with the greatest variability occurring in 1985. It is interesting to note that for each time period and during each year of the survey, with one exception in 1983, driver belt use rates were greater than those for RFP's. During the last three years, RFP belt use was greatest in the morning, when there was the greatest probability of an infant being in the car. Data from previous surveys showed that use rates by infants were much greater than those for other age groups, and, therefore, a greater number of these passengers would tend to push up usage rates.

Table 9

Belt Use by Time Periods

Occupant Seat Position	Period	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	A.M.	287	16.5	331	20.7	506	30.4	703	36.5
	Mid.	324	14.5	369	18.5	493	27.9	688	35.6
	P.M.	457	18.1	503	22.1	544	27.1	798	34.8
Right Front Passenger	A.M.	71	16.3	82	19.6	106	27.7	152	33.4
	Mid.	114	15.0	119	15.4	155	25.5	218	30.7
	P.M.	145	17.3	129	16.3	162	22.4	267	32.9
Remaining Passengers	A.M.	86	35.1	80	34.9	77	39.3	86	42.4
	Mid.	97	20.1	90	19.1	91	25.1	132	32.0
	P.M.	102	21.3	107	24.0	102	24.0	165	33.9

RP belt use in the morning period increased from 35.1% in 1983 to 42.4% in 1986, a 21% increase; for the midday period, the increase was from 20.1% in 1983 to 32.0% in 1986, a 59% increase; and for the afternoon period, the increase was from 21.3% in 1983 to 33.9% in 1986, a 59% increase. The RP belt use data show that there was more variability in usage by time period within any single year, but less year-to-year variability in belt use rates than those for drivers and RFP's. As previously noted for RFP's, the highest rate of RP use each year also was in the morning period. The data also indicate that in 1986 there was a narrowing of differences in the use rates when categorized by occupant seat position and survey time period. This was primarily due to the great increase in usage by drivers and RFP's.

Table 10 contains safety belt use data according to the ages of the occupant. There were too few pre-adult drivers for percentages of use to provide meaningful information. For the three other driver age categories, there was an increase in belt usage in each successive survey. Belt usage by young adult drivers increased from 14.3% to 34.6%, a 142% increase; that by middle adult drivers from 17.3% to 37.2%, a 115% increase; and the rate for older adults from 16.3% to 32.1%, a 97% increase. During all four years, middle adults had higher rates of use than did young and older adults. Middle adults accounted for the largest number of observed drivers and by having the highest rate of belt use these drivers have a major positive influence on highway safety in the Commonwealth. As noted above, young adult drivers had the greatest rate of increase in belt usage over the four years, and in the last three years had the second highest adult use rates. In 1986 34.6% of the young adult drivers were using safety belts. This figure is very close to the 1986 middle adult rate of 37.2%, which was the highest rate observed for any survey. This narrowing of differences and the accompanying yearly increases are a positive sign for highway safety, because young adults have traditionally been the group with the greatest number of high risk, high crash, and high conviction rate drivers. Finally, while older adult drivers had the lowest use rates among the age groups, it is encouraging to note that by 1986 32% were using safety restraints.

When belt use by RFP's was categorized by the age of the occupant, the data provided interesting similarities and contrasts. For occupants less than four years of age, there was little practical change in use rates (76.0% in 1983, 78.6% in 1984, 76.4% in 1985, and 75.0% in 1986). Because there was so little variability in the use rates, and because the state has a child restraint statute, these percentages probably represent the upper range of belt use obtainable for these passengers. RFP use rates by pre-adults were 21.8% in 1983 and 39.1% in 1986, a 79% increase; those for young adults were 11.0% in 1983 and 24.5% in 1986, a 123% increase; those for middle adults were 14.7% in 1983 and 33.4% in 1986, a 127% increase; and those for older adults were 15.0% in 1983 and 30.0% in 1986, a 100.0% increase. While young adult drivers had belt

Table 10

Belt Use by Age of Occupant

Occupant Seat Position	Age of Occupant	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Pre-Adult	0	----	1	20.0	2	50.0	4	28.6
	Young Adult	254	14.3	457	22.4	428	27.6	626	34.6
	Middle Adult	777	17.3	652	25.1	989	29.9	1,227	37.2
	Older Adult	37	16.3	93	16.6	124	21.9	332	32.1
Right Front Passenger	Infant	38	76.0	33	78.6	42	76.4	33	75.0
	Pre-Adult	64	21.8	64	20.1	92	30.0	122	39.1
	Young Adult	60	11.0	87	14.9	80	19.1	123	24.5
	Middle Adult	144	14.7	116	14.7	174	25.1	227	33.4
	Older Adult	24	15.0	30	12.1	35	14.6	132	30.0
Remaining Passengers	Infant	191	66.8	140	66.7	145	64.4	136	68.0
	Pre-Adult	81	15.7	116	20.8	102	21.7	194	32.6
	Young Adult	7	3.7	6	3.8	5	4.5	22	17.7
	Middle Adult	4	2.3	11	7.3	15	11.1	24	23.3
	Older Adult	2	5.0	4	6.0	3	6.8	7	8.9

use rates in 1986 similar to those of the other age groups, young adult RFP's had belt use rates significantly lower than those of the other age groups. The data also show that young, middle, and older adult RFP's had belt use rates lower than those for the drivers of the same age groups.

Belt use rates by infant RP's were relatively consistent over the four surveys, and each year nearly two-thirds of these occupants were observed to be in safety restraints. Use rates by other age groups of RP's increased each year and in 1986, the rate of use was 108% higher than that in 1983 for pre-adults, 378% higher for young adults, 913% higher for middle adults, and 78% higher for older adults. While the increases in usage by young and middle adults are extremely high on a comparative basis, the overall rate of use in 1986, the year with the highest rates, did not exceed a fourth of these occupants. In addition, RP usage rates are much lower than those of drivers and RFP's, leaving a lot of room for improvement. The data for the three age groups of occupants older than sixteen years of age do, however, provide an indication of just how few passengers were actually in these seating positions on a day-to-day basis. While usage rates were low, they do not represent the same level of safety problem as that for the other seating positions.

Three findings of significance can be derived from the analysis of belt use by various aged occupants. These are: 1) the increase in belt use over time for all age groups of drivers, 2) the relative stability of use rates by infant RFP's and RP's, and 3) the increasing use rates by young adult drivers and RFP's.

Table 11 presents data on safety belt use according to the area of the state surveyed. Each year, driver use rates were highest in the northern area and lowest in the western area. In all four survey areas, driver belt use increased in each successive year. In addition, there were significant changes in use rates in each area between the 1983 and 1986 surveys. The four-year increases were: 136% in the western area, 11.3% to 26.7%; 108% in the northern area, 22.7% to 47.1%; 110% in the central area, 13.9% to 29.2%; and 125% in the eastern area, 15.1% to 33.9%. While the greatest rate of use each year was in the northern area, the greatest rate of increase over the four years was in the western area. In 1986, there was considerable diversity in the rates of belt use in the four survey areas. Safety belt usage in the northern area was probably influenced by the mandatory use law in Washington, D.C., the place of employment for a large number of Northern Virginia residents (several of the survey sites were on routes used for commuting to work in the District). The large increase in the eastern area could be because two of the six survey sites were on approaches to military bases, and the military has put into effect their own version of a mandatory belt use provision. Finally, the low use rates in the western area could be the result of the ages of the vehicles surveyed. In past

Table 11

Belt Use by Area Surveyed

Occupant Seat Position	Survey Area	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent
Driver	Western	148	11.3	221	15.6	286	24.3	375	26.7
	Northern	468	22.7	505	27.3	597	33.8	960	47.1
	Central	232	13.9	232	16.6	334	24.7	403	29.2
	Eastern	220	15.1	245	20.5	326	28.5	451	33.9
Right Front Passenger	Western	53	13.5	62	13.1	70	19.0	111	24.3
	Northern	135	20.9	132	20.9	163	31.2	273	43.8
	Central	65	14.5	51	13.6	79	21.9	87	23.7
	Eastern	77	14.2	85	16.8	111	24.0	166	31.3
Remaining Passengers	Western	54	23.8	56	22.1	50	24.3	84	33.5
	Northern	81	21.7	100	24.6	91	31.3	132	36.8
	Central	68	25.8	40	21.1	48	26.5	63	33.5
	Eastern	82	24.0	81	27.3	31	26.5	104	34.2

years, when vehicle age data were collected, the western area had a larger percentage of older vehicles than in the other three survey areas. Previous state research has shown that belt use is lower in older cars.

From 1984 through 1986, there was a steady increase in belt use by RFP's in each of the four survey areas. During 1983, use rates were slightly higher than those in 1984 in two areas, the same in one, and lower in the fourth. As with drivers, the RFP use rate was highest in the northern areas, and, except in 1986, was lowest in the western area. Over the four years, use rates increased 80% in the western area, from 13.5% to 24.3%; 110% in the northern area, from 20.9% to 43.8%; 63% in the central area, from 14.5% to 23.7%; and 120% in the eastern area, from 14.2% to 31.3%. The rates of increase were greatest in the northern and eastern areas, and the reasons for these changes are the same as those described in the above section on driver use rates. RFP use was not as high as that for drivers in any of the four survey areas during 1984, 1985, and 1986. The results in 1983 were mixed; RFP use was higher in the central and western areas. With fewer than a fourth of these passengers using safety belts in the western and central areas in 1986, there appears to be ample opportunity for both a state and community effort aimed at increasing passenger belt usage.

For RP's, use rates were 41% higher in 1986 than in 1983 in the western area (33.5% vs. 23.8%), 70% higher in the northern area (36.8% vs. 21.7%), 30% higher in the central area (33.5% vs. 25.8%), and 43% higher in the eastern area (34.2% vs. 24.0%). These rates of increase were not nearly as great as those for drivers and RFP's. This is due to the fact that in 1983 RP use rates were considerably higher than those for drivers and RFP's, and in 1986 the divergance in usage by occupant seat position has narrowed so that rates of use were similar. Except for the northern area in 1986, use rates by RP's were higher than those for RFP's each year the survey was conducted. In 1983 and 1984, RP use rates were greater than those for drivers. In 1985 and 1986, driver use of belt systems had increased to such an extent that driver use was higher in the northern area both years and approached RP rates in the other three survey areas.

SUMMARY

Observational surveys of safety belt use in Virginia have been conducted in two series. The first series covered 1974 through 1977 and the second 1983 through 1986. Data were collected in February of 1974, 1975, and 1976, and in June in each of the five other years. This document reports the data only from the second series of observations. A number of the general findings from this latter series are similar to those from the first. They also are similar to those that other researchers and organizations have reported over this same time period. The findings are divided into those considered to be major accomplishments or results, and those considered to be informational or interesting results.

Survey data indicate four major accomplishments. First, a significant percentage of infants were found to be protected in some form of safety restraint system. In each of the four surveys made subsequent to passage of the Child Safety Seat Law, over two-thirds of the passengers less than four years old were observed to be in safety restraints. The usage rate prior to the passage of the law was approximately 10%. Second, increasing proportions of passengers used safety belts when the driver used a lap or lap/shoulder belt. As the drivers availed themselves of increased protection, the percentage of passengers using restraints increased. Third, only a small percentage of other occupants, generally less than 10%, were found to be using belt systems when infant occupants were not in child safety seats. In the 1985 and 1986 surveys, over 52% of the drivers, 62% of the RFP's, and 77% of the RP's were using belt systems when a child was in a child seat. This indicates that as the adults in the vehicles make efforts to safeguard their infant passengers, they also demonstrate increased concern for their own safety through use of available belt systems. Fourth, there was a significant increase in the use of belt systems by drivers and passengers from 1983 to 1986. Belt use in June 1986 was 35.5% by drivers and 33.1% by all passengers. The lowest use rates were in June 1977, when only 16.3% of the drivers and 7.2% of the passengers used safety belt systems.

There were four interesting or informational findings which could influence educational or public relations campaigns. They include the following: 1) a greater percentage of female than male drivers and RFP's used safety belts; 2) in 1985 and 1986, belt use by drivers and passengers was highest in the morning; 3) for occupants other than infants, belt use was highest for middle adult drivers and pre-adult passengers; and 4) belt use was highest in the northern area and lowest in the western area of the state.

In an effort to determine the significance of the findings related to belt use, the time period, location, and occupant characteristics of the survey sample were analyzed to determine whether they contributed to

changes in belt use patterns over the four years. The results of this analysis indicated that year-to-year variations in the proportions of vehicles surveyed in the three daily time periods and the four geographic areas of the state, and in the ratio of male and female drivers and passengers, should have no effect on statewide belt use percentages. Year-to-year variations in the ages of the observed occupants could lead to modest decreases in observed statewide belt usage. The analysis indicates that actual increases were observed and were much greater than what could have been expected from these changes in the survey samples.

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