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A Survey of Child Safety Seat and Safety Belt Use in Virginia: the 1987 Update

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Abstract

Observational surveys of belt use by the motoring public in Virginia have been conducted in two series: (1) 1974-1977 and (2) 1983-1987. Only the latter data are presented in this report. Each year data were collected in the Roanoke, Northern Virginia, Richmond, and Tidewater areas. In 1987, nine small communities were added to the survey sites: three each in the western, valley, and south-side areas of the state.

Observed belt usages are analyzed according to a number of occupant, vehicle, and geographic characteristics. Each of these is discussed in a separate section of the report. Belt use in the urban areas increased each year, and in 1987, 40.4% of the drivers and 32.9% of the passengers were using some form of safety restraint. Use rates in the towns were much lower than those in the urban areas. While there was considerable variability in the use rates among the towns surveyed, the overall town rates were 20.2% for drivers and 19.5% for passengers. Urban and town rates were combined and treated as statewide rates. These statewide rates were 34.3% for drivers and 28.9% for passengers.

There are a number of other findings presented in the report. Among these are the following: (1) belt use is highest in the northern area of the state; (2) in the last two years, there was little difference in the rates of use throughout the day; (3) each year, over two-thirds of all infants were in child safety seats, but in 1987, 37.5% were incorrectly restrained; and (4) in 1987, young adults had the highest rates of use.

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 child safety seats. It was further concluded that a number of other factors have combined to raise safety belt usage by other vehicle occupants, and these voluntary rates have approached levels comparable to usage rates in states with mandatory usage laws.

It is recommended that additional state and local effort to increase safety belt use should be directed at small communities and in the western area of the state.

A SURVEY OF CHILD SAFETY SEAT AND SAFETY BELT USE IN VIRGINIA

The 1987 Update

by

Charles B. Stoke
Research Scientist

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

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SUMMARY OF FINDINGS

Surveys of occupants of passenger vehicles to determine safety restraint usage have been conducted in Virginia since 1974. In 1983, the first year after passage of the Child Safety Seat Law, observers also gathered data on the use of restraints by child passengers. This report presents data from each of the survey years from 1983 through 1987 and compares the 1987 data with that of the four earlier years.

This summary uses three exhibits to array the most significant data. In Exhibit 1, data are presented on the safety belt use rates in urban areas from 1983 through 1987, use rates from the 1987 town survey, and the combined urban and town rates for 1987 that are considered statewide rates. Among the data contained in Exhibit 1 are those associated with the sex and age of the occupant, the time of day the data were collected, and the area of the state surveyed. The data for the rates of belt use by occupant seat position and age of occupant for each of the communities surveyed are contained in Exhibit 2. From these figures, it can be determined where the rates were high or low and this information can be used by state and local officials in the initiation of special programs to increase safety belt use in designated areas. These data also provide a belt use baseline for subsequent evaluations of the effectiveness of such efforts. Because some of the rates of use reported in Exhibit 2 either are very high (100.0%) or very low (2.0%), Exhibit 3, which shows the actual number of persons who were using safety belts, has been included. In this way, the reader can determine the relative significance of the rates of use shown. These three exhibits also form the basis for the summarization of the major findings enumerated below. Each section of this report, urban, town, and statewide, contains a detailed summary of all findings identified in the section narrative.

1. In the urban areas, there was a 119% increase in total belt usage (17.3% to 37.9%) from 1983 to 1987.

2. Urban area driver use increased 146% (16.4% to 40.4%) and passenger use increased 73% (19.0% to 32.9%).

3. The driver, passenger, and total use rates in towns (20.2%, 19.5%, and 19.9%) were approximately half of those for urban area occupants in 1987.

4. The statewide use rate was 32.5% for all occupants; the statewide rates for drivers and passengers were 34.3% and 28.9%.

5. From 1983 to 1987, there were yearly increases in urban belt usage when the data were categorized by the sex of the occupant,

the time of day data were collected, and the area of the state surveyed.

6. When the urban data were categorized by the age of the occupant, there were yearly increases in usage by each age group except for infants.

7. Child safety seat use in the urban areas was a relatively constant 68-69% from 1983 through 1986, but dropped to 44% in 1987 primarily as a result of a change in survey procedures.

8. The combined correct and incorrect rates of urban safety seat use by infants was 70.7% in 1987, a rate similar to those of previous years.

9. Each year of the survey, urban belt use was lowest in the western area and highest in the northern area.

10. In 1987, town to town belt use rates varied from 11.6% to 31.6% for drivers and from 6.8% to 32.3% for passengers among the towns surveyed.

11. Among the various urban communities, belt use rates in 1987 varied from 24.9% to 59.6% for drivers and from 14.9% to 56.9% for passengers.

12. The lowest town belt use rates were in Emporia, and the highest were in Harrisonburg.

13. The lowest urban belt use rates were in the city of Richmond, and the highest were in Springfield.

14. In 1987, child safety seats were correctly used at nearly the same rate in both the urban areas and the towns.

15. The 1987 statewide results show that 37.5% of the child safety seats were incorrectly used.

EXHIBIT 1

Safety Belt Use

Summary of Results

	Urban 1983	Urban 1984	Urban 1985	Urban 1986	Urban 1987	Town 1987	State 1987
Total Cars	6,495	5,858	5,436	6,155	6,020	2,605	8,625
Total Persons	9,732	8,981	8,135	9,235	9,022	3,913	12,935
Total Belt Use	17.3%	20.1%	27.5%	34.7%	37.9%	19.9%	32.5%
Driver Belt Use	16.4%	20.5%	28.4%	35.5%	40.4%	20.2%	34.3%
Passenger Belt Use	19.0%	19.4%	25.7%	33.1%	32.9%	19.5%	28.9%
Male Use	17.2%	19.6%	26.9%	32.6%	34.7%	18.8%	30.1%
Female Use	19.3%	20.7%	28.0%	36.6%	40.6%	20.8%	34.5%
Morning	18.4%	22.0%	30.7%	36.4%	38.0%	16.0%	32.5%
Mid-Day	15.4%	17.9%	27.0%	34.0%	38.6%	19.0%	32.1%
Afternoon	18.3%	21.1%	25.6%	34.2%	37.2%	23.4%	32.8%
Infant Use	68.2%	68.7%	66.8%	69.3%	43.9%	45.1%	44.2%
Pre-Adult Use	17.9%	20.5%	25.1%	34.7%	37.4%	19.6%	31.7%
Young Adult Use	12.7%	19.7%	24.6%	31.7%	38.6%	21.6%	33.8%
Middle Adult Use	16.4%	18.6%	28.4%	36.2%	38.6%	17.7%	32.2%
Older Adult Use	14.7%	14.5%	19.1%	30.4%	33.6%	18.6%	28.6%
Western Urban	13.2%	15.9%	23.2%	27.0%	28.5%	-----	-----
Northern Urban	22.2%	25.5%	33.0%	45.2%	46.8%	-----	-----
Central Urban	15.3%	16.5%	24.4%	28.6%	35.9%	-----	-----
Eastern Urban	16.2%	20.1%	27.1%	33.3%	35.7%	-----	-----
Western Town	-----	-----	-----	-----	-----	19.2%	-----
Valley Town	-----	-----	-----	-----	-----	25.7%	-----
Southside Town	-----	-----	-----	-----	-----	16.0%	-----

EXHIBIT 2

Percentage of Occupants Using Safety Belts

1987 Results by Community Surveyed

Community	Total	Drivers	Passengers	Infants	Pre-Adults	Young Adults	Middle Adults	Older Adults
Marion	19.0	20.8	13.8	100.0	7.7	19.0	18.2	27.5
Wytheville	18.3	18.2	18.5	40.0	14.3	14.3	19.1	23.1
Galax	21.4	23.2	17.8	22.2	14.7	24.0	17.6	30.8
Covington	18.9	18.9	19.0	25.0	15.6	17.1	19.4	22.7
Lexington	23.2	22.2	25.7	70.0	60.0	23.1	19.7	18.1
Harrisonburg	31.8	31.6	32.3	61.5	32.8	41.7	24.3	22.2
Emporia	10.4	11.6	6.8	33.3	3.9	17.5	10.7	2.0
South Boston	16.2	16.8	15.2	50.0	17.5	15.7	15.3	13.0
Farmville	18.6	18.0	19.4	36.0	22.5	21.5	14.7	11.8
Vinton	23.7	23.7	23.7	46.2	27.2	20.2	23.4	20.7
Salem	26.9	29.6	21.8	50.0	28.3	26.6	23.3	31.0
Roanoke	31.5	30.5	33.9	57.1	35.8	32.2	29.4	28.2
Alexandria	42.9	47.0	35.2	43.9	34.5	40.9	45.1	46.3
Arlington Co.	44.0	49.7	35.5	46.7	36.3	46.7	41.6	48.0
Fairfax Co.	50.0	52.6	41.8	83.3	39.1	52.4	55.3	27.3
Springfield	58.6	59.6	56.9	53.8	65.1	56.3	62.8	39.1
Woodbridge	49.3	52.9	39.5	57.1	42.1	49.1	50.3	47.4
Annandale	50.6	53.1	43.9	80.0	43.5	52.9	48.4	51.4
Richmond	21.9	24.9	14.9	23.1	23.1	23.1	22.2	18.5
Henrico Co.	36.8	39.8	29.3	36.4	37.2	32.7	40.8	34.2
Chesterfield Co.	45.3	46.1	43.1	50.0	51.1	39.3	50.3	32.5
Norfolk	34.4	38.3	26.3	31.4	26.2	36.4	33.1	38.6
Hampton	33.2	34.5	30.9	30.3	32.3	40.9	31.8	18.4
Newport News	43.8	46.3	41.1	27.3	51.2	45.8	45.9	33.9
Combined								
Urban	37.9	40.4	32.9	43.9	37.4	38.6	38.6	33.6
Towns	19.9	20.2	19.5	45.1	19.6	21.6	17.7	18.6
State	32.5	34.3	28.9	44.2	31.7	33.8	32.2	28.6

EXHIBIT 3

Number of Occupants Using Safety Belts

1987 Results by Community Surveyed

Community	Total	Drivers	Passengers	Infants	Pre-Adults	Young Adults	Middle Adults	Older Adults
Marion	66	54	12	3	3	16	33	11
Wytheville	116	76	40	8	7	34	40	27
Galax	63	45	18	2	5	18	22	16
Covington	55	40	15	1	5	14	25	10
Lexington	88	61	27	7	9	25	28	19
Harrisonburg	154	101	53	8	22	65	45	14
Emporia	35	29	6	2	2	14	16	1
South Boston	69	45	24	6	7	21	25	10
Farmville	134	74	60	9	32	45	37	11
Vinton	96	56	40	6	22	20	36	12
Salem	183	131	52	9	17	55	63	39
Roanoke	317	218	99	20	39	83	113	62
Alexandria	493	353	140	18	39	146	214	76
Arlington Co.	344	234	110	7	33	151	104	49
Fairfax Co.	165	132	33	5	9	55	84	12
Springfield	187	121	66	7	41	71	59	9
Woodbridge	150	118	32	4	8	54	75	9
Annandale	123	94	29	4	10	45	46	18
Richmond	115	92	23	3	9	42	44	17
Henrico Co.	232	178	54	8	29	68	102	25
Chesterfield Co.	329	239	90	17	47	84	156	25
Norfolk	327	246	81	11	22	135	115	44
Hampton	204	133	72	10	21	85	74	14
Newport News	156	87	69	3	21	44	67	21
Combined								
Urban	3,421	2,432	989	132	367	1,138	1,352	432
Towns	780	525	255	46	92	252	271	119
State	4,201	2,957	1,244	178	459	1,390	1,623	551

CONCLUSIONS

There were yearly increases in driver and passenger safety belt usage in urban areas from 1983 through 1987. The precise reasons for these changes cannot be determined from the data collected. Events that have occurred during these five years do indicate that some of this increase could have resulted from increased publicity and some from the passage of the Child Safety Seat Law and an accompanying spillover effect to other occupants.

The high rate of child safety seat use is directly attributable to the passage of the safety seat statute in the 1982 session of the legislature. Prior to 1983, fewer than 20% of the infants in surveyed automobiles were restrained in safety seats. Immediately after the effective date of the statute, the rate of use was nearly 70% and has remained relatively stable over the five-year period.

The drop in 1987 in the rate of correct child seat usage was due to a change in the data collection process. A special training session on the identification of correct use patterns resulted in the observers being less lenient in their recording of correct child seat use. The combined correct and incorrect use in 1987 was similar to the rates from the previous four years.

There was considerable variability between the safety belt usage rates in the urban areas and the towns. There also were large differences in the rates within the four urban areas, as well as among the towns surveyed. The data do not identify the reasons for these differences.

RECOMMENDATIONS

Belt use patterns in the state indicate that future efforts to bolster the wearing habits of Virginians should be directed to the residents of towns and rural areas. In addition, state and local governments should in the short run (1-2 years) conduct little activity and expenditure of funds for programs in areas where use rates already exceed half of the occupants observed.

A SURVEY OF CHILD SAFETY SEAT AND SAFETY BELT USE IN VIRGINIA

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INTRODUCTION

It is generally agreed that the use of automobile safety belts is one of the easiest and most efficient methods of preventing the death and injury that result from a motor vehicle crash. It is unfortunate that this consensus does not yield a requisite improvement in the belt use habits of the motoring public. Because motor vehicle occupants are frequently not belt users, a number of methods have been used in an attempt to bolster the use of these safety devices.

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

Observational surveys of safety belt use in Virginia have been conducted in two series. The first series covered 1974 through 1977, and the second 1983 through 1987. Data were collected in February of 1974, 1975, and 1976 and in June of each of the remaining six years. 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 survey, conducted during June 1977, was the first to include observations on the use of child restraints. After the 1977 survey, it was determined that annual 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 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, and in June, observers were in the field collecting data on the use of child restraints. At the same time, data were collected on the use of safety belts by other vehicle occupants. Belt use data have been collected each summer since 1983 because efforts by various groups and members of

the legislature have been sufficient to keep the matter in the media, and these efforts could have influenced user rates and patterns.

PURPOSES

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

SURVEY METHODOLOGY

In the second and third weeks of June of each year since 1983, observers surveyed vehicle occupants in the four metropolitan areas of the state. They worked two days in the Roanoke-Salem area (Western Urban), three days in the Alexandria-Arlington-Springfield-Woodbridge area (Northern Urban), two days in the Richmond-Henrico-Chesterfield area (Central Urban), and two days in the Norfolk-Hampton-Newport News area (Eastern Urban). These observations began on Thursday morning and except for a travel day on Saturday of the first week, continued for ten days ending on Saturday evening of the second week.

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.

For the 1987 survey, data collection procedures were slightly modified through the addition of nine small jurisdictions to the survey sites. Throughout this report, these localities will be referred to as towns even though some are actually defined as small cities. During the first week of June, one day was worked in the Marion-Wytheville-Galax area (Western Town), one in the Covington-Lexington-Harrisonburg area (Valley Town), and one in the Emporia-South Boston-Farmville area (Southside Town). The survey time periods were also somewhat different than those used in the urban areas and were selected based on the traffic patterns and volumes within the community as well as the time of day the major employment centers began and ended the work day. In addition,

because each set of towns was spread out over a wide geographic area, time had to be allowed for travel from one survey location to the next. Three time periods were used: (1) 7:00 a.m. to 9:00 a.m., (2) 11:00 a.m. to 1:00 p.m., and (3) 4:00 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 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 years prior to 1986, any incorrect child seat use was recorded as if the seat was not being used. For 1986 and 1987, 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.

One major change was made in the survey procedures for 1987. This involved the recording of correct or incorrect use of child safety seats. This change came about because of concerns expressed on both a state and national level that the observers from previous surveys were being too lenient in their recording of correct usage. Christina Frank of the Transportation Safety Training Center at Virginia Commonwealth University conducted a training session for the observation team and the primary researcher. This year's team was made more aware of features of child seat use that should lead them to record the use as incorrect. A number of items were discussed, and examples were studied. In addition, sample seats were used to demonstrate various principles. Among the items that would determine use patterns were (1) the routing of the lap

Figure 1

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
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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.)

belt through the seat structure, (2) the orientation of the seat (was it facing the proper direction for the age of the occupant), (3) the use of the child seat harness (being sure that it was clipped together and that the occupant was properly within it), (4) the presence of a locking clip and top tether strap (and the style of seat where they might be expected), and (5) the use (or non-use) of arm bars and shields. In previous years, only the belt routing and use of arm bars/shields were closely observed. Because of the changes added in 1987, it was very likely that correct belt use would be lower than in previous years. A check on this can be made by adding correct and incorrect use rates for each of the five years (1983-1987), and if the totals for 1987 are similar to those in the other years (but correct usage is dissimilar), it can then be assumed that the new, more stringent procedures were responsible for any difference in the correct use rates in 1987.

ANALYSIS

The survey data in this report are discussed in three sections. In the first, data from the urban areas are analyzed; these data are a continuation of data collected at the same sites used since 1974. Only the data collected since 1983 are included in this report. The second section uses data collected in nine small towns located in three different geographic areas of the state. Small town data collection was added in 1987; therefore, there are no comparable figures from previous years. In the third section, the 1987 combined urban and small town data are treated as statewide data. These combined data are also a new feature of the survey.

Urban Area Belt Usage

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

The data in Table 1 show the rates of safety belt use by drivers and passengers. Rates of use for the occupants of each seat position are based on the number of occupants using the various restraint devices as a function of all occupants in that position. Thus, the figures in Table 1 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

TABLE 1

Use of Safety Belts

Urban Areas

Occupant Seat Position	Age of Occupant	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	Lap Only	132	2.0	165	2.8	128	2.4	156	2.5	93	1.5
	Lap/Shoulder	936	14.4	1,030	17.7	1,415	26.0	2,033	33.0	2,339	38.9
	None	5,427	83.6	4,656	79.5	3,893	71.6	3,966	64.4	3,588	59.6
Right Front Passenger	Lap Only	51	2.5	59	3.0	64	3.7	80	4.0	66	3.5
	Lap/Shoulder	246	12.1	247	12.5	322	18.8	524	26.5	575	30.3
	Child "A"[1]	33	1.6	24	1.2	37	2.2	33	1.7	37	2.0
	Child "Z"[2]	N/A[3]	--	N/A	--	N/A	--	4	0.2	15	0.8
	None	1,700	83.7	1,653	83.4	1,292	75.3	1,337	67.6	1,202	63.4
Remaining Passengers	Lap Only	82	6.8	139	12.1	108	11.0	224	20.3	212	19.2
	Lap/Shoulder	13	1.1	7	0.6	20	2.0	24	2.2	14	1.3
	Child "A"	190	15.7	131	11.4	142	14.4	135	12.3	95	8.6
	Child "Z"	N/A	--	N/A	--	N/A	--	27	2.4	68	6.1
	None	922	76.4	870	75.9	714	72.6	692	62.8	718	64.9

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.

0-4 age group. Subsequent tables in the report show age group usage rates.

There has been a significant increase in overall safety belt use by urban area drivers and passengers over these five years of the survey. The use of lap belts has remained at a relatively stable level of less than 3% over the period. Part of this stability is accounted for by the limited number of vehicles equipped with this belt system and the fact that there is little change in vehicle ownership from year to year. Driver use of the lap/shoulder (L/S) system increased from 14.4% in 1983 to 38.9% in 1987, and there was an increase in usage each year. In 1987, over 40% of all observed urban drivers were using some type of safety restraint system. The 1987 figures represent a 146% increase in usage over that found in 1983.

Right front passenger (RFP) belt use increased each year, with most of this usage accounted for by the use of the L/S belt system. There was an increase in L/S usage in each of the successive surveys, rising from 12.1% in 1983 to 30.3% in 1987. The use of lap belts has been in the 3.0% to 4.0% range over this period. The percentage of correctly used child safety seats has remained stable at nearly 2.0% of all occupants observed each year. Overall, occupant restraint usage by RFPs was 16.3% in 1983 and 35.8% in 1987. This is a major gain in occupant protection and safety for these passengers and is a 120% increase during the five-year period.

For 1986 and 1987, the data included a new usage classification: incorrectly used child safety seats. Because this was an in-traffic survey, the observation team could not enter the vehicles to check for certain installation characteristics. In 1986, only the most obviously misused systems were identified, but in 1987, the observers received special training and were less lenient in attributing usages as correct usage. In 1986, only four of the thirty-seven infants in child safety seats in the RFP seat position were classified as being incorrectly restrained. In 1987, 15 of the 52 infants were categorized as in incorrectly used child safety seats. This misuse of child seats was nearly 11.0% in 1986, but almost 29% in 1987.

Belt use by the remaining passengers (RPs) followed the same general trends seen for drivers and RFPs during the first four years. Usage was 24.6% in 1983 and increased each year until it reached 34.8% in 1986, but dropped to 29.1% in 1987, primarily because 6.1% of the occupants were classified as in incorrectly used child safety seats. Use of the L/S system was relatively low and remained stable because only a few vehicle models have these belt systems installed for RPs. The use of lap belts was 6.8% in 1983 and 19.2% in 1987. This 182% increase was accompanied by a major drop in correctly used child seats, from 15.7% in 1983 to 8.6% in 1987. Twenty-seven of the 162 infants in

child safety seats were categorized as incorrectly restrained in 1986, but in 1987, 68 of the 163 infants were so categorized. Although this incorrect use accounted for only 2.4% of all RPs in 1986, it accounted for nearly 17% of the infants in child seats. In 1987, the 68 incorrect users accounted for only 6.1% of all RP occupants, but 42% of the infant RPs were incorrectly restrained. A change from 2.4% to 6.1% seems only a modest change. In reality, the change was from 17% to 42% of the RP occupants who were infants.

Data collected during the five surveys show that safety belt usage has gone up each year and that over a third of the drivers and passengers were observed to be using safety restraints in 1987. This increase in usage in Virginia is consistent with data collected on a nationwide basis, which also have shown increases in belt usage. In addition, Virginia's use rates now approach the levels found in states with mandatory use laws (MULs).

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 period from January through June of 1986. These figures are nearly identical to those reported in this document. Eight of these nineteen cities were in states with mandatory safety belt use laws in effect.

In states with MULs, 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 had a special belt use enforcement activity in progress), (6) California (7/86) - 26% to 42%, and (7) Illinois (7/86) - 21% to 42%. Voluntary use rates in Virginia are not different from the rates in several of these MUL states and, in fact, are more similar to the rates 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 2. The survey results from all five years indicate that when the driver was not using safety belts most of the RFPs also were not using belt systems. While there were slight increases in belt usage each year between 1983 (5.4%) and 1987 (12.0%), the fact remains that over 88% of all the RFPs riding in cars with non-belted drivers were not using the safety restraints available to them. The belt use figures for the RPs were only slightly better than those for the RFPs, but a large majority (over 80%) of these passengers also were not using safety belts when riding with non-belted drivers. While

TABLE 2

Association Between Driver and Passenger Uses of Safety Belts

Urban Areas

Occupant Seat Position	Occupant Use of Belts	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
When Drivers Not Using Belts											
Right Front Passenger	Belted	92	5.4	97	6.0	92	7.3	127	9.6	142	12.0
	Not Belted	1,598	94.6	1,528	94.0	1,176	92.7	1,199	90.4	1,046	88.0
Remaining Passengers	Belted	173	17.2	138	15.4	93	13.4	118	16.6	83	11.6
	Not Belted	830	82.8	760	84.6	600	86.6	591	83.4	632	88.4
When Drivers Using Safety Belts											
Right Front Passenger	Belted	238	70.4	233	65.1	331	74.0	510	77.3	536	75.8
	Not Belted	100	29.6	125	34.9	116	26.0	150	22.7	171	24.2
Remaining Passenger	Belted	111	54.7	139	55.8	177	60.8	265	67.4	238	60.7
	Not Belted	92	45.3	110	44.2	114	39.2	128	32.6	154	39.3

the RP use rates have varied over the years, the greatest rate of use (17.2%) was in 1983. In addition, the RP use rate in 1987 (11.6%) was the lowest for all five years and was even lower than the 1987 RFP rate. A low RP rate is cause for concern because these are the seat positions used primarily by infants and young children. While the adults might elect not to protect themselves, it should be expected that they would protect their children, especially in light of a statute regulating this activity.

The data were also categorized according to RFP and RP use patterns when the driver was using a safety belt system. Over the last three years, approximately three-fourths (74.0%, 77.3%, and 75.8%) of the RFPs were using safety belts when riding with drivers who were using their belts. Even in 1983 and 1984, nearly two-thirds of these occupants were using safety belts. The figures for the RPs were not nearly as high as those for the RFPs. The rates have varied from just over half of the RP occupants in 1983 and 1984 who were using belts to just over two-thirds of them in 1986. Since 1985, over 60% of the RPs have also been using belts when the driver was using them.

The survey data presented in Table 2 indicate that when drivers were using safety belts a very large proportion of the passengers were also using safety belt systems. Conversely, when drivers were not using a belt system, a very large 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 3 focus on the extent to which drivers and passengers used restraint systems when infants were in the vehicle. As previously discussed, the 1986 and 1987 surveys had three passenger use classifications for infants: (1) an infant in a correctly used safety seat, (2) an infant in a safety seat that was incorrectly used, and (3) an infant in the car but not restrained in any type of safety seat.

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 these five survey periods, use rates for drivers ranged from 25.1% in 1983 to over 50% in 1985, 1986, and 1987. Over this same period, belt usage rates for RFPs varied from 17.2% in 1983 to 65.0% in 1985, and those for RPs varied from 23.1% in 1983 to 81.1% in 1984. The 1987 rates of use were 39.1% for RFPs and 34.3% for RPs. These rates are much lower than those of 1985 and 1986 and were due to changes in the criteria used for determining correctly used belt systems. For drivers, the increase in belt use occurred after the 1984 survey; for RFPs and RPs, this change in use

TABLE 3

Belt Use by Other Occupants in Vehicles with Infant Passengers

Urban Areas

Use By Other Occupants	Belt Use	When Infant Seats Were Correctly Used									
		1983		1984		1985		1986		1987	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Driver	Belted	51	25.1	44	30.8	86	52.4	79	52.0	62	50.4
	Not Belted	152	74.9	99	69.2	78	47.6	73	48.0	61	49.6
Right Front Passenger	Belted	16	17.2	41	42.3	76	65.0	64	62.1	18	39.1
	Not Belted	77	82.8	56	57.7	41	35.0	39	37.9	28	60.9
Remaining Passengers	Belted	18	23.1	146	81.1	170	77.3	154	78.2	24	34.3
	Not Belted	60	76.9	34	18.9	50	22.7	43	21.8	46	65.7

Use By Other Occupants	Belt Use	When Infant Seats Were Incorrectly Used									
		1983		1984		1985		1986		1987	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Driver	Belted							5	16.7	33	41.3
	Not Belted	DATA ON INCORRECT						25	83.3	47	58.8
Right Front Passenger	Belted	USE NOT COLLECTED						4	19.0	14	35.9
	Not Belted	DURING 1983, 1984,						17	91.0	25	64.1
Remaining Passengers	Belted	AND 1985 SURVEYS						6	12.0	24	46.2
	Not Belted							44	88.0	28	53.8

TABLE 3 - CONTINUED

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	1987 Number	1987 Percent
Driver	Belted	5	4.6	10	11.6	13	15.7	1	2.8	16	19.8
	Not Belted	104	95.4	76	88.4	70	84.3	35	97.2	65	80.2
Right Front Passenger	Belted	9	9.8	12	16.0	8	11.6	0	0.0	8	100.0
	Not Belted	83	90.2	63	84.0	61	88.4	31	100.0	0	0.0
Remaining Passengers	Belted	16	8.7	20	15.8	6	4.4	0	0.0	10	7.6
	Not Belted	167	91.3	107	84.2	130	95.6	58	100.0	121	92.4

*During 1983, 1984, and 1985 surveys, if a child safety seat was incorrectly used, this was recorded as if the seat was not being used.

rates occurred after the 1983 survey. These results, therefore, are probably a result of the passage of the Child Safety Seat Law in 1983.

The analysis of driver and passenger usage rates when the infant was incorrectly restrained provides an interesting contrast. In 1986, 16.7% of the drivers, 19.0% of the RFPs, and 12.0% of the RPs were using safety devices when riding in cars with infants categorized as being incorrectly restrained. The 1987 data, however, show a much different pattern of usage: 41.3% of the drivers, 35.9% of the RFPs, and 46.2% of the RPs were using safety devices when the child safety seat was incorrectly used. In addition, the 1987 differences in usage by occupant seat position are much smaller than the differences in usage in 1986 if they are compared on the bases of correct and incorrect child seat use. There is less than a 10 percentage point difference for drivers, 3 points for RFPs, and 12 points for RPs, with the RP rate actually being higher when the infant seat was identified as being incorrectly used. In 1987, at least 41% of the drivers, 36% of the RFPs and 34% of the RPs were using a safety device when there was an infant in the car and the infant was in a child seat, whether the seat was identified as being correctly or incorrectly used.

If the infant occupant was not in either a child safety seat or a safety belt, most of the drivers and passengers also were not using their available safety restraints. Each year, fewer than 20% of these drivers were using safety restraints, although the use rate in 1987 (19.8%) was the highest over this five-year period. Even this use rate is significantly lower than statewide driver use rates in all years since 1985. The non-use rates for RFPs have been the most variable of all data categories in the entire longitudinal survey, ranging from 100% non-use in 1986 to 100% usage in 1987. Over the years, the number of occupants in this RFP category has gradually diminished to the point, that in 1987, there were only eight individuals involved in the sample. For RPs, belt usage did not exceed 16% in any year, and in 1987, fewer than 8% of these occupants were using safety restraints. As with drivers, the RFP and RP use rates were generally below statewide usage rates for these seat positions.

When there was an infant in the vehicle, belt use rates by the other occupants followed a consistent pattern: each year, the lowest occupant use rates occurred when the infant was not restrained by any safety device, and the highest rates occurred when the infant was observed to be in a correctly used child seat. It is apparent that when the adults in the car are not concerned that the infant occupant is safeguarded through the use of safety devices, they are also less likely to protect themselves by wearing safety belts.

The data in Table 4 depict safety belt use according to the sex of the occupant. Belt usage increased in each succeeding year for both

TABLE 4

Belt Use by Sex of Occupant

Urban Areas

Occupant Seat Position	Sex of Occupant	1983		1984		1985		1986		1987	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Driver	Male	538	15.5	638	19.5	752	26.4	1,064	33.1	1,071	36.0
	Female	530	17.5	565	21.9	791	30.6	1,125	38.2	1,361	44.7
Right Front Passenger	Male	98	15.0	97	14.2	143	25.4	185	29.0	212	34.4
	Female	232	16.9	233	17.9	280	24.3	452	33.8	466	36.4
Remaining Passenger	Male	120	24.0	139	27.8	143	31.8	157	34.5	147	27.8
	Female	165	23.4	138	21.3	127	23.7	226	34.9	164	28.4

male and female drivers, female RFPs, and male RPs. The yearly increases for male RFPs and female RPs were interrupted by slightly lower rates in 1984. Belt use by male drivers increased from 15.5% in 1983 to 36.0% in 1987, a 132% increase in usage. Belt use by female drivers increased from 17.5% in 1983 to 44.7% in 1987, an increase of 155% in usage. Each year, female drivers used safety belts at a higher rate than did males, and the five-year rate of increase in usage also was greater for female drivers.

While belt use by male and female RFPs was lower each year than that for drivers, there was an increase, except for males in 1984, in the rate of use each year. Belt use by male RFPs increased from 15.0% in 1983 to 34.4% in 1987, a 129% increase. Belt use by female RFPs increased from 16.9% in 1983 to 36.4% in 1987, a 115% increase. Female RFP belt use rates were higher than those for males each year with the exception of 1985, but the five-year rate of increase was slightly less. In 1987, male and female RFP use rates had less diversity than did the male and female driver rates and varied by only two percentage points. In addition, male and female RFP and male driver rates were nearly the same, but the female driver rate of use was 8 to 10 percentage points greater than those for the other drivers and RFPs.

The survey data presented in Table 4 indicate that belt use rates by RPs were less variable, and generally were greater, than those for occupants of the other seat positions. The male RP rate increased from 24.0% in 1983 to 34.5% in 1986, but then dropped to 27.8% in 1987. The female RP rate increased from 23.4% in 1983 to 34.9% in 1986, but also dropped in 1987 to 28.4%. Female RP use was lower than that for males in 1984 and 1985, but was nearly the same in the other three years. In 1987, slightly over a fourth of the male and female RPs were observed to be using a safety belt system. This is only a modest 3 to 5 percentage point increase in usage over the five-year period. Over this same period, there was a significant increase in belt use rates by male and female drivers and RFPs, and in 1987, over a third of these occupants were using a safety belt system.

Table 5 contains safety belt use data according to the ages of the occupant. Except for 1987, there were too few pre-adult drivers in the survey samples 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 use by young adult drivers increased from 14.3% to 42.4%, a 197% increase; that by middle adult drivers from 17.3% to 40.4%, a 134% increase; and the rate for older adults increased from 16.3% to 34.6%, a 112% increase. During the first four years (1983-1986), middle adult drivers had higher rates of use than did young and older adults, but in 1987, the rates of use by both pre- and young adults were higher than those for middle adults. Middle adults accounted for the largest number of observed safety belt users

TABLE 5

Belt Use by Age of Occupant

Urban Areas

Occupant Seat Position	Age of Occupant	1983		1984		1985		1986		1987	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Driver	Pre-Adult	0	----	1	20.0	2	50.0	4	28.6	25	51.0
	Young Adult	254	14.3	457	22.4	428	27.6	626	34.6	945	42.4
	Middle Adult	777	17.3	652	25.1	989	29.9	1,227	37.2	1,159	40.4
	Older Adult	37	16.3	93	16.6	124	21.9	332	32.1	294	34.6
Right Front Passenger	Infant	38	76.0	33	78.6	42	76.4	33	75.0	37	56.9
	Pre-Adult	64	21.8	64	20.1	92	30.0	122	39.1	160	47.1
	Young Adult	60	11.0	87	14.9	80	19.1	123	24.5	170	29.3
	Middle Adult	144	14.7	116	14.7	174	25.1	227	33.4	185	33.2
	Older Adult	24	15.0	30	12.1	35	14.6	132	30.0	126	35.8
Remaining Passengers	Infant	191	66.8	140	66.7	145	64.4	136	68.0	95	40.3
	Pre-Adult	81	15.7	116	20.8	102	21.7	194	32.6	182	30.7
	Young Adult	7	3.7	6	3.8	5	4.5	22	17.7	14	12.0
	Middle Adult	4	2.3	11	7.3	15	11.1	24	23.3	8	10.1
	Older Adult	2	5.0	4	6.0	3	6.8	7	8.9	14	12.0

each year, and by having relatively high rates of belt use over the five years, have had a major positive influence on highway safety within the Commonwealth. Young adult drivers had the greatest rate of increase (nearly 200%) in belt usage over the five years. In addition, the 1987 young adult use rate (42.4%) was the second highest rate observed over the five years (following only the 1987 pre-adult rate of 51.0%). This finding is 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 1987 nearly 35% of them were using safety restraints.

When belt use by RFPs 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 difference in use rates over the 1983-1986 period (76.0%, 78.6%, 76.4%, and 75.0%), but there was a significant drop to 56.9% in correct usage in 1987 primarily because of changes in the observation procedures. Because the state has had a child restraint statute since 1983, these percentages probably represent the upper range of use of occupant protection devices for these passengers. RFP use rates by pre-adults were 21.8% in 1983 and 47.1% in 1987, a 116% increase; those for young adults were 11.0% in 1983 and 29.3% in 1987, a 166% increase; those for middle adults were 14.7% in 1983 and 33.2% in 1987, a 126% increase; and those for older adults were 15.0% in 1983 and 35.8% in 1987, a 139% increase. The data also show that in most years young, middle, and older adult RFPs had belt use rates lower than those for drivers of the same age groups. Although the young adult RFP rate of safety belt usage has been among the lowest each year data have been collected, over the five-year period these occupants have had the largest percentage increase in usage. While they are still lagging behind the use rates of other groups, the spread is starting to narrow somewhat. RFP use rates are now 30% or better for each age group, which is an improvement from the rates in the low teens observed in 1983.

Belt use rates by infant RPs were relatively consistent over the first four surveys, and each year nearly two-thirds of these occupants were observed to be in safety restraints. In addition, belt use rates by other age groups of RPs increased each year from 1983 to 1986. In 1987, however, the belt use rates for all age groups, with the exception of older adults, decreased from 1986 levels. While they were lower in 1987 than in 1986, they were generally higher than the rates for the previous years. The changes in the procedures for the recording of correct and incorrect child seat use seems to account for the drop in infant RP use rates, but there is no ready explanation for the drop in the 1987 rates for pre-adults, young adults, and middle adults. Over the entire five-year period, RP usage rates have been much lower than

those of drivers and RFPs. The data for the three age groups of occupants sixteen years of age and older do, however, provide an indication of just how few passengers were actually in these seating positions on a day-to-day basis.

Data on safety belt usage by survey time period are contained in Table 6. 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 1987, the variance by time period had decreased to just over one percentage point, indicating a relatively stable rate of use throughout the day.

When the data were considered on a longitudinal basis, there was a large increase in belt use during each time period from 1983 to 1987. During the 8:00 to 10:30 a.m. period, driver use increased from 16.5% in 1983 to 39.8% in 1987, a 141% increase. In the 11:30 a.m. to 2:00 p.m. survey period, driver use increased from 14.5% in 1983 to 41.0% in 1987, a 183% increase. In the 3:30 to 6:00 p.m. period, driver use increased from 18.1% in 1983 to 40.5% in 1987, a 124% increase.

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 35.9% in 1987, a 120% increase. For the midday period, the increase was from 15.0% in 1983 to 37.5% in 1987, a 150% increase. For the afternoon period, belt use increased from 17.3% in 1983 to 34.2% in 1987, a 98% increase. 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 (just over five percentage points) occurring in 1985. It is interesting to note that for each time period each year of the survey, with one exception in 1983, driver belt use rates were greater than those for RFPs.

There was a general increase in RP belt use during all three survey time periods over the 1983-1986 observation period. These increases ranged from 21% in the morning to 59% at midday and in the afternoon. In 1987, however, there was a drop in the usage rate during all three periods from those observed in 1986. These drops were 13 percentage points in the morning, 8.5 points in the afternoon, and just over 2 points at midday. In each year of the first four years, there was more variability in RP belt usage among the three survey time periods than there was for either drivers or RFPs. These differences were as large as 15 percentage points. The drops in the RP rates in all three time periods in 1987 resulted in a change in the variability in usage rates throughout the day. The most recent survey results show only a difference of 4.5 percentage points between the highest and

TABLE 6

Belt Use By Time Period

Urban Areas

Occupant Seat Position	Time Period	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	A.M.	287	16.5	331	20.7	506	30.4	703	36.5	837	39.8
	Mid.	324	14.5	369	18.5	493	27.9	688	35.6	753	41.0
	P.M.	457	18.1	503	22.1	544	27.1	798	34.8	842	40.5
Right Front Passenger	A.M.	71	16.3	82	19.6	106	27.7	152	33.4	199	35.9
	Mid.	114	15.0	119	15.4	155	25.5	218	30.7	235	37.5
	P.M.	145	17.3	129	16.3	162	22.4	267	32.9	244	34.2
Remaining Passengers	A.M.	86	35.1	80	34.9	77	39.3	86	42.4	91	29.4
	Mid.	97	20.1	90	19.1	91	25.1	132	32.0	122	29.8
	P.M.	102	21.3	107	24.0	102	24.0	165	33.9	98	25.3

lowest daily use rates. The significance of these changes is that the morning use rate in 1987 was the lowest since 1983 and the 1987 midday and afternoon rates were higher than those for the 1983-1985 period. Finally, there was a narrowing of differences in the RP use rates when categorized by occupant seat position and survey time period.

The driver and RFP data from 1986 and 1987 and the RP data from 1987 indicate that the results of observational surveys of safety belt use are not dependent on the time of day the data are 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 safety belt use by their residents. Thus, it does not matter what time of day the occupants are surveyed for their belt-wearing habits because the survey team will find the same general rate of use throughout the day.

Table 7 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 1987 surveys. The five-year increases were: 158% in the western area (11.3% to 29.1%), 123% in the northern area (22.7% to 50.7%), 174% in the central area (13.9% to 38.1%), and 154% in the eastern area (15.1% to 38.3%). While the greatest rate of use each year was in the northern area, the greatest rate of increase over the five years was in the central area. The five-year increase was nearly the same (slightly over 150%) in both the western and eastern areas.

In 1987, there was considerable diversity in the rates of belt use in the four survey areas. Just over 50% of all observed drivers in the northern area were using safety belts, nearly 40% of the drivers in the central and eastern areas were using them, and slightly less than 30% of the drivers were belted in the western area. Safety belt usage in the northern area was probably influenced by the MUL 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 and from the District). The rate in the eastern area could have been influenced by the fact that two of the six survey sites were on approaches to military bases, and the military has their own version of an MUL. The large increase in driver belt use in the central area, especially between 1986 and 1987, was likely the result of publicity associated with the passage of the state's mandatory use law for all front seat occupants. Finally, the low use rates in the western area could be the result of the ages of the vehicles surveyed and the attitudes of the residents of that area of the state toward belt use. In past years, when vehicle age data were collected, the western area had a

TABLE 7

Belt Use By Area Surveyed

Urban Areas

Occupant Seat Position	Survey Area	1983 Number	1983 Percent	1984 Number	1984 Percent	1985 Number	1985 Percent	1986 Number	1986 Percent	1987 Number	1987 Percent
Driver	Western	148	11.3	221	15.6	286	24.3	375	26.7	405	29.1
	Northern	468	22.7	505	27.3	597	33.8	960	47.1	1,052	50.7
	Central	232	13.9	232	16.6	334	24.7	403	29.2	509	38.1
	Eastern	220	15.1	245	20.5	326	28.5	451	33.9	466	38.3
Right Front Passenger	Western	53	13.5	62	13.1	70	19.0	111	24.3	120	27.6
	Northern	135	20.9	132	20.9	163	31.2	273	43.8	292	44.2
	Central	65	14.5	51	13.6	79	21.9	87	23.7	105	30.8
	Eastern	77	14.2	85	16.8	111	24.0	166	31.3	161	35.1
Remaining Passengers	Western	54	23.8	56	22.1	50	24.3	84	33.5	71	26.8
	Northern	81	21.7	100	24.6	91	31.3	132	36.8	118	30.3
	Central	68	25.8	40	21.1	48	26.5	63	33.5	62	30.1
	Eastern	82	24.0	81	27.3	31	26.5	104	34.2	60	24.3

larger percentage of older vehicles than were found in the three other survey areas. Previous state research has shown that belt use is lower in older cars.

From 1984 through 1987, there was a steady increase in belt use by RFPs in each of the four survey areas. As with drivers, the RFP use rate was highest in the northern area and except in 1986, was lowest in the western area. Over the five years, RFP use rates increased 104% in the western area (13.5% to 27.6%), 112% in the northern area (20.9% to 44.2%), 112% in the central area (14.5% to 30.8%), and 147% in the eastern area (14.2% to 35.1%). RFP use was not as high as that for drivers in any of the four survey areas during the period from 1984 through 1987. The results in 1983 were mixed: RFP use was higher in the central and western areas. With fewer than a third of the RFPs using safety belts in the western and central areas in 1987, the year with the highest use rates, there appears to be ample opportunity for both a state and community effort aimed at increasing passenger belt usage.

Over the survey period from 1983 through 1986, RP belt use had increased in all four areas of the state. In 1987, however, there was a drop in use rates in all four areas from those found in 1986. These changes resulted in a moderate 8.5-point (40%) five-year increase in RP use in the northern area, a small 4-point (17%) increase in the central area, a small 3-point (13%) increase in the western area, and no real change (less 1%) in the eastern area. These long-term rates of increase were much less than those for drivers and RFPs when categorized by area of the state. Except for the northern area in 1986, use rates by RPs were higher than those for RFPs in the 1983 through 1986 period. In 1987, the RP rates were lower than the RFP rates. In the western and central areas, they were less than one point lower, and in the northern and eastern areas, they were over ten points lower. When RP and driver belt use rates were compared, there were mixed results over the five-year period. The rate of use by northern area drivers was higher in each of the surveys. RP use in the western area was higher than that for drivers in 1983, 1984, and 1986; the same in 1985; and lower in 1987. Central area RPs had a higher rate of belt use from 1983 through 1986 but lower in 1987. Finally, western area RPs had higher rates in 1983, 1984, and 1986, and lower rates in 1985 and 1987. As can be determined from the above discussion of RP belt use rates over the period from 1983 through 1987, the current rate of use is such that state occupant protection program officials should make a strong effort in the child restraint area in an attempt to bolster current use patterns.

These driver and passenger use data have several implications for state highway safety officials. Among these factors are those dealing with the need to direct specific programs, public information campaigns,

and other specialized activities to increase belt use in a manner that will yield the maximum benefits. These data indicate that little or no effort should be directed to the northern area of the state and an increased effort should be directed to the western area where greater benefits can be gained from expenditures of funds, time, and effort.

Urban Area Summary

Safety belt usage data collected in the urban areas can be summarized as follows:

1. The percentage of drivers using safety belts increased each year and was 40.4% in 1987.

2. The percentage of RFPs using safety belts increased each year and was 35.8% in 1987.

3. The percentage of RPs using safety belts increased each year through 1986, but dropped to 29.1% in 1987.

4. Each year, over two-thirds of all infants were in safety seats or belts.

5. In 1987, almost 29% of the RFP and 42% of the RP child seats were incorrectly used.

6. Only part of the drop in child seat use in 1987 can be attributed to the change in the procedures for recording correct and incorrect use.

7. There was a positive association between driver and passenger use of safety belts: if one used them, there was an increased tendency for the other to use them.

8. When there was a correct use of the child safety seat, there was an increased probability of belt use by other occupants.

9. A slightly greater percentage of female drivers and RFPs used safety belts.

10. There was little difference in 1986 and 1987 in belt use by the time of the day the survey was conducted.

11. For occupants over four-years old, pre-adults (4 to 16 years) had the highest rate of use, but young adults (17 to 30 years) had the greatest rate of increase over the five years.

12. Belt use was highest in the northern area and lowest in the western area of the state.

Safety Belt Usage in Smaller Communities

In 1987, for the first time, data were collected in communities other than the major metropolitan centers of Virginia. Every town (and most of the smaller cities) in the state was considered for inclusion in the sample (the term "town" is used to refer to these localities). Time, travel limitations, and costs prevented the collection of data in each of them. Several were eliminated because it was known that they were part of special community programs to raise the belt use of their residents, and this would bias the results of observed baseline use. Others were eliminated because of other characteristics such as the absence of traffic signals where observers could stand to collect data in accordance with previously established procedures, or because of their distance from the next closest town (travel time in excess of two hours between sites would eliminate the town from consideration). Once this disqualification process was accomplished, the author visited 30 towns and observed the traffic flow at every signalized intersection in each (see Exhibit 4). In addition, tables published by the VDOT that listed the vehicle traffic counts for the major thoroughfares approaching each town were reviewed. Several of these towns had very little traffic during the survey hours, and others lacked a safe observation site for the survey team to collect data. Nine towns in three different geographic regions of the state were chosen to be included in the survey

EXHIBIT 4

Localities Considered for Inclusion

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

sample. In reality, there were only a few other towns that could have been included in addition to these nine. The survey hours were (1) 7:00 a.m. to 9:00 a.m., (2) 11:00 a.m.to 1:00 p.m., and (3) 4:00 p.m. to 6:00 p.m., hours of observation similar to but not identical with those in the urban areas. These hours were selected because of the special travel circumstances in these areas.

Because this is the first year town data have been collected, there are no longitudinal data for which rates of change can be analyzed. The results, therefore, are compared to those obtained from the urban areas in 1987. The data in Table 8 show the rates of belt use by the three classifications of occupants. The usage rates for towns are based on the number of occupants using safety devices as a function of all occupants in that seat position. Total driver belt use (21.2%) was considerably lower than the 40.4% rate that was observed in the urban areas. In both classifications of jurisdictions, town and urban, the use of the L/S combination accounted for nearly all of the driver usage. There also was a large difference in usage rates among the towns themselves (see Exhibit 2). This diversity ranged from 11.6% driver use in

TABLE 8

Use of Safety Belts

Small Towns - 1987

Occupant Seat Position	Restraint Use	Number	Percent
Driver	Lap Only	22	0.8
	Lap/Shoulder	503	19.3
	None	2,080	79.8
Right Front Passenger	Lap Only	16	1.8
	Lap/Shoulder	131	14.9
	Child "A"	13	1.5
	Child "Z"	4	0.5
	None	714	81.3
Remaining Passengers	Lap Only	55	12.8
	Lap/Shoulder	10	2.3
	Child "A"	33	7.7
	Child "Z"	20	4.7
	None	312	72.6

Emporia to 31.6% in Harrisonburg. Only 18.2% of the RFPs in the surveyed towns used safety restraints, a rate nearly half that for RFPs in urban areas (35.8%). There was a smaller difference in RP use rates in towns and urban areas than those for drivers and RFPs; 22.8% of the RPs in towns used safety devices whereas 29.1% of those in urban areas did so. As with drivers, the town passenger use rate was lowest in Emporia (6.8%) and highest in Harrisonburg (32.3%). Belt use by drivers and passengers in towns in 1987 is similar to belt use in urban areas in 1984. Nearly 80% of the drivers, 82% of the RFPs, and 77% of the RPs were not using safety devices in 1987 when riding through the towns of Virginia. A concentrated effort in these localities by state and local safety and enforcement officials should produce gradually rising belt use rates, which after some period of time, should become comparable to current urban use rates.

The association between driver and passenger use of safety belts in towns is shown by the data in Table 9. When the driver was not using

TABLE 9

Association Between Driver and Passenger Uses of Safety Belts

Small Towns - 1987

When Drivers Not Using Belts

Occupant Seat Position	Occupant Use of Belts	Number	Percent
Right Front Passenger	Belted	30	4.3
	Not Belted	674	95.7
Remaining Passengers	Belted	31	9.2
	Not Belted	306	90.8

When Drivers Using Safety Belts

Occupant Seat Position	Occupant Use of Belts	Number	Percent
Right Front Passenger	Belted	130	74.7
	Not Belted	44	25.3
Remaining Passengers	Belted	67	72.0
	Not Belted	26	28.0

a safety device, 95.7% of the RFPs and 90.8% of the RPs also were not using their safety devices. In comparison, the 1987 urban area rates indicate that 88.0% of the RFPs and 88.4% of the RPs were not using belts when riding with unbelted drivers. In contrast with the non-use rates, when town drivers were using their safety belts, so were 74.7% of the RFPs and 72.0% of the RPs. The 1987 urban area rates showed that 75.8% of the RFPs and 60.7% of the RPs were belted when riding with belted drivers. Both the urban and town data collected during 1987 indicate that the belt use trends are in the same direction in both types of jurisdictions. When the driver was belted, the passengers tended to also be belted; when the driver was not, the passengers were not. While the general trends were the same, the rates of use were not. There was a greater proportion of non-belted town passengers in cars with non-belted drivers, but there was a slightly smaller proportion of non-belted town passengers in cars with belted drivers.

An issue that first arose in 1986 was the extent to which safety belts were used by other occupants when there was an infant in the car. The data in Table 10 categorize belt use rates for town drivers and passengers when the infant seat was correctly used, when the infant seat was incorrectly used, and when the infant was not protected by any type of safety restraint. When the infant seat was correctly used, 51.1% of the drivers, 50.0% of the RFPs, and 52.2% of the RPs used some type of safety restraint. When the infant seat was incorrectly used, only 8.7% of the drivers (two persons), 14.3% of the RFPs (two persons), and no RPs used a safety device. When the infant was not in any type of safety belt or child seat, only 6.5% of the drivers (two) used a safety belt and no one else in any of the other vehicles used a safety belt. There are basically two results from the town data: (1) when the infant seat was correctly used at least half of the other vehicle occupants used a safety belt; and (2) in cases of incorrect child seat use or the absence of any safety belt use, very few other occupants used safety devices.

The 1987 urban area data showed an increasing rate of safety belt use by other occupants in the car when the child seat was not used, used incorrectly, and used correctly: the smallest percentage of other occupants using belts were in cars with unprotected infants, and the largest percentage of users was when the infant seat was correctly used (see Table 3). Belt use by drivers and passengers was higher in the towns than that in the urban areas when the infant seat was correctly used (51.1%, 50.0%, and 52.2% versus 50.4%, 39.1%, and 34.3%). Driver and passenger belt use rates were lower in the towns than in the urban areas in the other two classifications of infant restraint usage. In the towns, no rate exceeded 14.3%, and for several categories of occupants, no one was using a safety belt. The urban area rates varied from 7.6% to 100.0%, with several categories having rates in the 40% range.

TABLE 10

Belt Use by Other Occupants in Vehicles with Infant Passengers

Small Towns - 1987

When Infant Seats Were Correctly Used

Use by Other Occupants	Belt Use	Number	Percent
Driver	Belted	23	51.1
	Not Belted	22	48.9
Right Front Passenger	Belted	9	50.0
	Not Belted	9	50.0
Remaining Passengers	Belted	12	52.2
	Not Belted	11	47.8

When Infant Seats Were Incorrectly Used

Use by Other Occupants	Belt Use	Number	Percent
Driver	Belted	2	8.7
	Not Belted	21	91.3
Right Front Passenger	Belted	2	14.3
	Not Belted	12	85.7
Remaining Passengers	Belted	0	0.0
	Not Belted	9	100.0

When Infants Were Not Using Restraints

Use by Other Occupants	Belt Use	Number	Percent
Driver	Belted	2	6.5
	Not Belted	29	93.5
Right Front Passenger	Belted	0	0.0
	Not Belted	0	0.0
Remaining Passengers	Belted	0	0.0
	Not Belted	47	100.0

Data on belt use according to the sex of the town occupants are contained in Table 11. Female drivers used belts at a higher rate (22.2%) than did males (17.8%). Town male RFPs had belt use rates higher (20.7%) than those for female RFPs (16.9%). There was little difference in male (22.4%) and female (21.8%) rates for RPs in the towns surveyed. When town use rates were compared with those from the urban areas, both male and female town rates of use for drivers were less than half the rates of use in the urban areas (see Table 4). Urban area female drivers had a 44.7% use rate and male drivers had a 36.0% rate of use. Male and female RFP urban rates were 34.4% and 36.4%, respectively, 66% and 115% greater than the town rates of 20.7% and 16.9%. As with the RP rates in towns, there was little difference in the male and female urban rates of 27.8% and 28.4%; but the urban rates were 24% and 30% greater than those for the town RP occupants (22.4% and 21.8%).

TABLE 11

Belt Use by Sex of Occupant

Small Towns - 1987

Occupant Seat Position	Sex of Occupant	Number	Percent
Driver	Male	216	17.8
	Female	309	22.2
Right Front Passenger	Male	62	20.7
	Female	98	16.9
Remaining Passengers	Male	45	22.4
	Female	50	21.8

Belt use data by the age of the town occupant are contained in Table 12. With the exception of pre-adults, the older the age group of drivers the lower their rate of belt use. The highest rate of driver use (23.0%) was by young adults and the lowest (14.3%) was by pre-adults. There was little practical difference in middle (19.0%) and older (18.2%) adult use rates. When categorized by the age of the occupant, driver use rates in the urban areas were nearly double those in

the towns for three categories of occupants (see Table 5). They were 84% greater for young adults, 113% greater for middle adults, and 90% greater for older adults. For pre-adults, the urban area rate of safety belt use was over 3.5 times that for the towns. Although widely divergent, there is little useful value to this difference because so few pre-adult town drivers were surveyed (21) and used belts (3).

TABLE 12

Belt Use By Age of Occupant

Small Towns - 1987

Occupant Seat Position	Age of Occupant	Number	Percent
Driver	Pre-Adult	3	14.3
	Young Adult	201	23.0
	Middle Adult	241	19.0
	Older Adult	80	18.2
Right Front Passenger	Infant	13	65.0
	Pre-Adult	36	18.8
	Young Adult	48	18.5
	Middle Adult	29	12.6
	Older Adult	34	19.1
Remaining Passengers	Infant	33	40.2
	Pre-Adult	53	20.6
	Young Adult	3	8.8
	Middle Adult	1	2.9
	Older Adult	3	8.8

Pre-adult, young adult, and older adult RFP town occupants had belt use rates within one percentage point of each other. The data indicate that 18.8% of the pre-adult, 18.5% of the young adult, and 19.1% of the older adult RFPs used safety belts. The highest town rate (65.0%) was by infant RFPs, and the lowest (12.6%) was by middle adult RFPs. When town and urban RFP rates were compared, the town occupants, except for infants, had much lower belt use rates. The 1987 survey data show that 65.0% of the infants in towns and 56.9% of those in urban areas were correctly using safety restraints. Urban rates were approximately 2.5 times greater for pre-adults and middle adults, 58% greater for young

adults, and 87% greater for older adults. The greatest rate of use by town RPs was by infants (40.2%) and the lowest rate was by middle adults (2.9%). The pre-adult RP rate (20.6%) was the second highest, and both young and older adults used safety belts at the same 8.8% rate. When town and urban rates were compared, there was no difference in the infant RP rates: just over 40% in both types of jurisdictions. For the other four RP age categories, the urban rate was 2.5 times the town rate for middle adults, nearly 50% greater for pre-adults, and over 35% greater for both young and older adults. For all three classifications of seat position and each age category of occupant, urban and town trends were similar: a gradually decreasing use rate with an increase in driver age, a much higher RFP and RP infant use rate than for the other age groups, and a lower RFP and RP middle adult use rate than for the other age groups. While the urban and town trends were similar, rates of safety belt use in each age/seat category were greater in the urban areas.

Town belt use data by survey time period are contained in Table 13. For all three occupant seat positions, the trend of usage was similar: the lowest rate of usage was during the morning period and the highest rate was during the afternoon. Although the trends were similar, the rates of use were different for each group of occupants. For drivers, 17.1% used belts in the morning, 19.0% in the mid-day period, and 23.8% in the afternoon. The RFP rates were 14.4%, 16.8%, and 21.4%; and the RP rates were 10.0%, 24.1%, and 25.4%. The driver rates were higher

TABLE 13

Belt Use by Time Period

Small Towns - 1987

Occupant Seat Position	Time Period	Number	Percent
Driver	A.M.	123	17.1
	Mid.	182	19.0
	P.M.	220	23.8
Right Front Passenger	A.M.	25	14.4
	Mid.	56	16.8
	P.M.	79	21.4
Remaining Passengers	A.M.	8	10.0
	Mid.	35	24.1
	P.M.	52	25.4

than those for RFPs in all three periods, and higher than the morning RP rate. Mid-day and afternoon RP rates were higher than those for drivers and RFPs. While there were substantial variations in town rates of use according to time period and seat position, it is important to note that fewer than a fourth of the drivers and passengers were using safety belts. It should also be pointed out that variations in usage throughout the day may be less a function of the time of day the observations occurred than of the communities in which the data were collected. This appears to be verified by the data from the individual communities contained in Exhibits 2 and 3.

Throughout this section of the report, rates of use by town occupants have been contrasted with those of occupants from the urban areas. For drivers and RFPs, safety belt use in the morning and mid-day periods in the urban areas were more than double those observed in the towns (see Table 6). In the afternoon period, urban area belt uses by drivers and RFPs were over 60% greater than those in the towns. When belt use by the RPs was considered, urban area use was nearly three times that in the towns in the morning, 25% greater at mid-day, and no different in the afternoon. As previously stated, variations between urban and town usage rates, when categorized by time of day, may be more a function of the characteristics of the towns and cities in which the data were collected than the hour of the day the observations occurred.

Belt use data by the area of the state in which the towns were located are contained in Table 14. There were significant differences in the driver and passenger rates of use in the three areas of the state. For drivers and RFPs, use rates were highest in the valley and lowest in the southside areas. In the valley, 25.0% of the drivers, 24.0% of the RFPs, and 35.3% of the RPs were observed to be using their safety belts. In the area west of Interstate 77, 20.1% of the drivers, 17.3% of the RFPs, and 17.4% of the RPs were using safety belt systems. In the towns surveyed and considered part of the rural southside, 16.0% of the drivers, 14.9% of the RFPs, and 18.4% of the RPs used safety belts. Because of the differences in the community characteristics, the belt use data from each of the town areas could not be logically contrasted to the use data from the complementary urban area that was surveyed; but generally, driver and passenger town use rates were approximately half of those for the urban areas. The town data do indicate, however, how low the belt use rates were in the smaller jurisdictions and point out where state and community efforts might best be directed to improve the health and traffic safety of the citizens of the Commonwealth. Without a major increase in belt use by persons outside of the metropolitan areas, there is little possibility that overall belt use rates in Virginia will exceed 40% of the drivers and passengers travelling the state.

TABLE 14

Belt Use by Area Surveyed

Small Towns - 1987

Occupant Seat Position	Survey Area	Number	Percent
Driver	Western	175	20.1
	Valley	202	25.0
	Southside	148	16.0
Right Front Passenger	Western	49	17.3
	Valley	59	24.0
	Southside	52	14.9
Remaining Passengers	Western	21	17.4
	Valley	36	35.3
	Southside	38	18.4

Town Summary

The results of survey data collected from towns located in three different areas of the state can be summarized as follows:

1. Driver and passenger uses of occupant protection devices was considerably lower in the towns than in the urban areas.

2. There was a positive association between driver and passenger use of safety belts: if one group used them, there was an increased tendency for the others to use them.

3. When the infant seat was correctly used, at least half of the other vehicle occupants used a safety belt.

4. Female drivers used safety belts at a greater rate than did males.

5. The highest rate of driver use was by young adults.

6. There was little difference in the RFP rates of use by the pre-adults, young adults, and older adults.

7. Safety belt use was lowest in the morning and highest in the afternoon. These results are more likely due to the characteristics of the communities surveyed than to the time of day the survey was conducted.

8. Driver and RFP use rates were highest in the valley area and lowest in the southside area.

Statewide Safety Belt Usage

The urban and town data were combined to produce statewide use figures. There are no data from the rural areas because data collection procedures, time, and expense mitigated against obtaining these use figures. The inclusion of rural rates would likely lower the statewide figures reported here. The magnitude of this change is unknown, but based on a number of factors, would probably not exceed a three to five percentage point reduction in the overall rate of use for drivers and passengers.

The data in Table 15 indicate the rates of belt use by drivers, RFPs, and RPs. The various caveats for interpreting use rates have been discussed in previous sections of this report and apply to these data as well. Driver use of occupant safety devices was at a rate greater than that for passengers. Over a third (34.3%) of all drivers surveyed were identified as using a safety belt. While this is a rate comparable

TABLE 15

Use of Safety Belts

Statewide - 1987

Seat Position	Occupant Use	Restraint Number	Percent
Driver	Lap Only	115	1.3
	Lap/Shoulder	2,842	33.0
	None	5,668	65.7
Right Front Passenger	Lap Only	82	3.0
	Lap/Shoulder	706	25.5
	Child "A"	50	1.8
	Child "Z"	19	0.7
	None	1,916	69.1
Remaining Passengers	Lap Only	267	17.4
	Lap/Shoulder	24	1.6
	Child "A"	128	8.3
	Child "Z"	88	5.7
	None	1,030	67.0

to the 1986 urban rate of 35.5%, it is still discouraging to know that nearly two-thirds of all drivers surveyed in June 1987 were not using the most effective automobile safety device readily available for their use. In addition, nearly 70% of the RFPs and 73% of the RPs were not using safety restraints. These figures provide the basis for the evaluation of activities to increase belt use. The activities related to the implementation of the state's MUL may be able to produce an increase in the belt-wearing habits of Virginians. And finally, 107 of the 285 (37.5%) infant passengers in child safety seats were categorized as being incorrectly restrained. It is apparent that additional work is necessary to educate parents in the proper installation of child safety seats in the vehicle and in the correct placement of their children within the seat itself. The primary errors in the use of child seats involved belt routing, seat orientation, and use of the arm bar/shields.

The data on the association between driver and passenger uses of safety belts are contained in Table 16. From these data, two basic

TABLE 16

Association Between Driver and Passenger Uses of Safety Belts

Statewide - 1987

When Drivers Not Using Belts

Occupant Seat Position	Occupant Use of Belts	Number	Percent
Right Front Passenger	Belted	172	9.1
	Not Belted	1,720	90.9
Remaining Passengers	Belted	114	10.8
	Not Belted	938	89.2

When Drivers Using Safety Belts

Occupant Seat Position	Occupant Use of Belts	Number	Percent
Right Front Passenger	Belted	666	75.6
	Not Belted	215	24.4
Remaining Passengers	Belted	305	62.9
	Not Belted	180	37.1

findings can be drawn: (1) when the driver was not belted, 90% of the passengers were not belted, and (2) when the driver was belted, 75.6% of the RFPs and 62.9% of the RPs were also belted. The RP rates were especially discouraging because these are the seat positions used primarily by occupants younger than sixteen years of age (for those younger than four years old, there is a state statute requiring safety seat use). These data do indicate, however, that any method that successfully gets one vehicle occupant to buckle up is likely to work on the other occupants in the same vehicle.

The rates of use by drivers and passengers when there was an infant in the car are contained in Table 17. When the infant seat was categorized as being correctly used, 50.6% of the drivers, 42.2% of the RFPs, and 38.7% of the RPs also were using a safety belt. Overall, 45.5% of all other occupants were using a safety belt when the infant seat was correctly used. When the infant seat was incorrectly used, a smaller proportion of drivers and passengers were using safety belts than when the seat was correctly used. Just over a third (35%) of all other occupants were using a safety belt when an infant was incorrectly restrained in a child safety seat. The rate of usage was 34.0% for drivers, 30.2% for RFPs, and 39.3% for RPs. For this category of infant (incorrectly used safety seat), the driver rate was nearly 15 points lower, the RFP rate was 12 points lower, and the RP rate was nearly the same as the use rates found when the child seat was correctly used. When there was an infant in the car who was not in a safety seat or a belt, few drivers or passengers were using safety belts. Only 16.1% of the drivers protected themselves at the same time that they did not protect their child, and only 9.7% of all other occupants (18 of 186) were protected by a safety belt when there was an unprotected child in the car. These belt use data are in the direction of expected results; unprotected infants and few protected other occupants, partially protected infants and an increased proportion of protected occupants, and fully protected infants and the largest rate of other occupants using safety belts.

Safety belt use rates when categorized by the sex of the occupant are contained in Table 18. Female drivers had a belt use rate of 37.6%, while that for males was only 30.7%, a difference of just over 22%. Not only was the rate higher, but in the 1987 survey the number of female drivers who were using safety belts was greater than that for males. In the case of both RFPs and RPs, there was little practical difference in the male and female use rates: they differed by less than a half of a percentage point in each instance. This is an indication that the sex of the occupant does not determine belt use rates. Female RFPs had a use rate of 30.4% and the rate for males was 29.9%; female RPs had a use rate of 26.5% and the rate for males was 26.3%. Finally, there was

TABLE 17

Belt Use by Other Occupants in Vehicles with Infant Passengers

Statewide - 1987

When Infant Seats Were Correctly Used

Use by Other Occupants	Belt Use	Number	Percent
Driver	Belted	85	50.6
	Not Belted	83	49.4
Right Front Passenger	Belted	27	42.2
	Not Belted	37	57.8
Remaining Passengers	Belted	36	38.7
	Not Belted	57	61.3

When Infant Seats Were Incorrectly Used

Use by Other Occupants	Belt Use	Number	Percent
Driver	Belted	35	34.0
	Not Belted	68	66.0
Right Front Passenger	Belted	16	30.2
	Not Belted	37	69.8
Remaining Passengers	Belted	24	39.3
	Not Belted	37	60.7

When Infants Were Not Using Restraints

Use by Other Occupants	Belt Use	Number	Percent
Driver	Belted	18	16.1
	Not Belted	94	83.9
Right Front Passenger	Belted	8	100.0
	Not Belted	0	0.0
Remaining Passengers	Belted	10	5.6
	Not Belted	168	94.4

nearly a 15% difference in the female RFP and RP use rates and almost a 14% difference in the male RFP and RP rates. This is a difference of less than four percentage points in the use rates by the two categories of passengers and indicates a relative consistency in safety belt use patterns by occupants other than drivers.

TABLE 18

Belt Use by Sex of Occupant

Statewide - 1987

Occupant Seat Position	Sex of Occupant	Number	Percent
Driver	Male	1,287	30.7
	Female	1,670	37.6
Right Front Passenger	Male	274	29.9
	Female	564	30.4
Remaining Passengers	Male	192	26.3
	Female	214	26.5

Table 19 contains safety belt use data according to the ages of the occupants. There was significant variability in the rates of use by occupants of the various seating positions. Generally, belt use was highest for drivers and lowest for RPs. For the drivers, however, the rate of safety belt use declined as the ages of the occupants increased. Statewide use in 1987 was 40.0% for pre- adults, 37.0% for young adults, 33.8% for middle adults, and 29.0% for older adults. In the early years of this longitudinal survey, when only urban area data were collected, middle adult drivers generally had the highest rate of belt use. As can be seen from these 1987 statewide data, this has changed: the rate for young adult drivers now exceeds that for middle adults. This improved pattern of use should yield an improvement in the morbidity and mortality rates for drivers 17-30 years of age.

TABLE 19

Belt Use by Age of Occupant

Statewide - 1987

Occupant Seat Position	Age of Occupant	Number	Percent
Driver	Pre-Adult	28	40.0
	Young Adult	1,155	37.0
	Middle Adult	1,400	33.8
	Older Adult	374	29.0
Right Front Passenger	Infant	50	58.8
	Pre-Adult	196	36.9
	Young Adult	218	26.0
	Middle Adult	214	27.2
	Older Adult	160	30.2
Remaining Passengers	Infant	128	40.3
	Pre-Adult	235	27.7
	Young Adult	17	11.3
	Middle Adult	9	8.0
	Older Adult	17	11.3

Belt use rates by RFPs varied from 26.0% for young adults to 58.8% for infants. The other use rates were 36.9% for pre-adults, 27.2% for middle adults, and 30.2% for older adults. When RFP rates are compared to those for drivers, only the older adult RFPs had a rate higher than that for the comparable aged drivers. The driver/RFP rate difference was greatest for young adults (11 points) and middle adults (6.5 points), and was relatively small for pre-adults (3 points) and older adults (less than 1 point). The RP belt use rates were lower than those for drivers and RFPs. They ranged from 8.0% of the middle adults to 40.3% of the infants. Both young and older adults had a 11.3% use rate and the pre-adults had a rate of 27.7%. The RP rates of use for infants, middle, and older adults were approximately 19 percentage points lower than the comparable RFP age group rates. The pre-adult RP rate was just over 9 points lower, and that for young adults was nearly 15 points lower. These data provide an identification of one group of target audiences for special methods or programs to increase belt usage by commuting motorists. Programs should be aimed first at RPs as a group and next at specific age strata, e.g., middle or young adults.

The figures on the use of safety belts in the three daily time periods in which data were collected are contained in Table 20. As with the other categorizations of data, driver use of belts was the highest, followed by that of the RFPs (3-5 percentage points lower), and then by the RPs (5-10 points lower than the driver rate). Within each category of vehicle occupant there was little difference in use rates throughout the day. For drivers, just over a third of the occupants used a safety belt, and the upper and lower daily rates varied by only two percentage points. Driver use rates were 34.0% in the morning, 33.4% at mid-day, and 35.4% in the afternoon. While RFP rates were lower than those for drivers, there was less variability in usage throughout the day, with the rates varying by only one percentage point from the lowest to highest. Less than a third of all of the RFPs used a safety belt in June 1987. The RFP use rates were 30.8% in the morning, 30.3% at mid-day, and 29.8% in the afternoon. Use rates by RPs were lower than those for drivers and RFPs and also were slightly more variable, with a three-percentage-point range from the lowest to the highest rate. The RP rates of use were 25.4% in the morning, 28.3% at mid-day, and 25.3% in the afternoon. The consistency of use throughout the day for each of the occupant seat position categories is a positive sign for the conduct of observational surveys of safety belt usage. 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.

TABLE 20

Belt Use by Time Period

Statewide - 1987

Occupant Seat Position	Time Period	Number	Percent
Driver	A.M.	960	34.0
	Mid.	935	33.4
	P.M.	1,062	35.4
Right Front Passenger	A.M.	224	30.8
	Mid.	291	30.3
	P.M.	323	29.8
Remaining Passengers	A.M.	99	25.4
	Mid.	157	28.3
	P.M.	150	25.3

Statewide Summary

The urban area and town safety belt use results have been combined into a set of statewide findings. These are summarized as follows:

1. Over a third (34.3%) of the drivers were using safety belts.

2. Less than a third (28.9%) of the passengers were using safety belts.

3. Of the infants surveyed, 37.5% were incorrectly restrained in safety seats.

4. There was a positive association between driver and passenger uses of safety belts.

5. When the infant seat was correctly used, a large percentage of the drivers and passengers were also using safety belts.

6. Female drivers had a higher rate of belt use than did males.

7. There was little difference in male and female passenger uses of safety belts.

8. The highest rate of driver belt use was by young adults.

9. The highest passenger use rates were by infants and pre-adults.

10. There was little difference in driver and passenger use rates throughout the day.

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