

CHILD SAFETY SEAT AND SAFETY BELT USE AMONG URBAN TRAVELERS

Results of the 1983 Survey

by

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## ABSTRACT

During nine days in June 1977 and nine in June 1983, four major metropolitan areas of Virginia were surveyed to determine whether safety restraints were being used by urban travelers. Observers stationed at selected signalized intersections displayed to stopped motorists a clipboard bearing the question, Are you wearing seat belts? The observers then approached the vehicles to visually verify any response given, and recorded whether safety belts or child safety seats were being used. They also recorded the license numbers of the vehicles and the sex and approximate age of each occupant.

One of the objectives of the 1983 survey was to determine the effects of the child safety seat legislation passed by the 1982 Virginia General Assembly. This survey showed that 64.6% of all infant occupants were restrained by state approved child seats as compared to 10.3% in 1977. The law also appeared to have had a positive effect on the use of safety restraints by the other vehicle occupants. Where an infant was in a child safety seat, there was an increased tendency for the other occupants to use safety restraints. The study also identified an association between the driver's use of the safety belt and use by the right front passenger (RFP). As driver use progressed from no use to lap only to lap/shoulder and as driver rate of use increased, so did belt use by RFPs.

While there was a significant increase in the use of restraint systems to protect infant passengers and important increases in usage by pre-adults, there was no change in the overall percentage of drivers using safety belts. There was, however, a major shift in the type of belt system used by drivers. In 1983, of the 16.4% of the drivers who were using safety belts, 14.4% were using the lap/shoulder combination. In addition, there was an increase from 9.8% to 16.2% in belt use by RFPs with use of the lap/shoulder combination accounting for 12.1% of the total usage in 1983. Belt use by remaining passengers (RPs) was also greater during the latter survey, 23.6% vs. 3.4%. Most of the increase was the result of the very large increase in the use of child restraints by infant RPs.



## SUMMARY OF FINDINGS

1. There was no change in the overall percentage of drivers using safety belts between the 1977 and 1983 surveys (16.3% vs. 16.4%).
2. There was a major shift in the type of belt system used by drivers. In 1983, of the 16.4% of the drivers who used safety restraints, 14.4% used the lap/shoulder combination.
3. Belt use by RFPs increased from 9.8% in 1977 to 16.2% in 1983. Most of this increase was in the use of lap/shoulder belts, which rose from 3.8% in 1977 to 12.1% in 1983.
4. Belt use by RPs increased from 3.4% in 1977 to 23.6% in 1983. Most of this increase resulted from the increase in use of child restraints by passengers younger than four years of age which rose from 10.2% in 1977 to 66.8% in 1983.
5. There was a positive association between driver and RFP use of safety belts. If one wore belts, there was an increased tendency for the other to also use belts.
6. Where infants were in safety seats, there was a tendency for increased use of safety restraints by other vehicle occupants.
7. A greater percentage of female drivers and RFPs used safety belts than did males.
8. There was little difference in safety belt use during any of the three daily time periods.
9. There were significant increases in restraint use by infant and pre-adult passengers in 1983 as compared to 1977.
10. Infant RFP use increased from 29.7% to 76.0% and RP use from 10.2% to 66.8%.
11. Pre-adult RFP use increased from 6.6% to 21.8% and RP use from 1.8% to 15.7%.
12. Belt use tended to be higher in newer vehicles.
13. A greater percentage of Northern Virginia drivers and RFPs used safety belts than did those in the other survey areas.
14. There were few changes in survey data percentages relative to time of day, area of state, sex of occupant, and age of occupant.



## CONCLUSION

Based on the analysis of the data collected in the 1977 base year and the survey data collected during the summer of 1983, it was concluded that Senate Bill 413 mandating the use of child safety seats by vehicle occupants under the age of four years had a positive effect on safety belt and child passenger restraint use in Virginia.



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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, and has been so for such a long period of time, that 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 various awards (in one instance new cars) 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, the three-point belt, and inertial reels, to promoting the use of restraints. A number of jurisdictions, including Virginia, have passed legislation requiring the use of child safety seats. In addition, legislation was introduced during the 1984 session of the Virginia General Assembly that would require the use of safety belts by other vehicle occupants. As yet, the legislature has not passed such a statute.

Through the years, there have been a number of investigations to determine the percentage of motor vehicle occupants using safety belts. In the early studies, the investigators used questionnaire and interview formats, while in later ones they have used a variety of observational techniques. It has been found that motorists responding to questions on their use of safety belts generally give the socially acceptable affirmative reply. Observations, however, have shown their actual belt use to be less than that stated.

The last observational survey in Virginia prior to the one reported here was conducted during the summer of 1977. During the interval, there were a number of intervening events that could influence the rate of safety belt usage. The 1982 General Assembly passed a statute to become effective January 1, 1983, requiring children younger than 4 years of age to be restrained in child safety seats. Also, there have been major changes in the size, weight, and design of vehicles, both domestic and imported, that should affect safety belt use. Finally, there is the possibility that efforts to promote safety consciousness over the intervening years produced an increase in the use of safety belts.

#### PURPOSE

The current study was initiated to determine the extent to which the law mandating use of safety seats changed the percentage of people using these safety devices. A second aspect of the study was to determine the extent of safety belt usage by all vehicle occupants and whether the percentages had changed since the survey in 1977.

#### SURVEY METHODOLOGY

In June 1983, observers surveyed four metropolitan areas of the state; namely, Western Virginia (Roanoke-Salem-Vinton), Northern Virginia (Alexandria-Arlington-Fairfax-Belvoir), Central Virginia (Richmond-Henrico-Chesterfield), and Eastern Virginia (Norfolk-Virginia Beach-Hampton). Each day of the week, Sunday through Saturday, was sampled for at least one full day, and Thursday and Friday were sampled for two days.

Three sites located in different sections of the survey areas were used each day. They were chosen because the thoroughfares 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. Traffic flow dictated the use of other lanes in some instances. A clipboard bearing the question, Are you wearing seat 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. Upon seeing the question, most occupants would reply. This reply was acknowledged, 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 passengers were using only the lap belt, both the lap and shoulder belts, or no form of restraint. In addition, they recorded whether any of the infants were in approved child seats. An "approved child seat" was defined as any of those models on the list distributed by the Virginia State Police as meeting their specification. Not included were models that hooked over the car seat or those that clearly were not adequately anchored to the vehicle. The survey personnel also recorded the sex and approximate age of each occupant, their seat in the vehicle, and the license number of the vehicle (see Figure 1).

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). Vehicle age was divided into four categories: (1) pre-1963, no restraint system required by law to be installed, (2) 1963-1971, restraint systems required to be installed in vehicles prior to sale, (3) 1972-1975, a restraint system installed and coupled to a continuous buzzer, an interlock device or both, (4) 1976 to present, a restraint system installed and coupled to a 4 to 8 second buzzer. To determine the vehicle age category, the observers recorded license plate numbers on the data sheets. These numbers were submitted to personnel of the Vehicle Services Administration (VSA) at the Division of Motor Vehicles (DMV), who accessed the vehicle file and provided the model years. The model year data were then categorized and keypunched at the same time as all the other data recorded on the survey form.

FIGURE 1

SAFETY BELT USAGE SURVEY FORM

Date Sheet No. \_\_\_\_\_ Start Time \_\_\_\_\_ Stop Time \_\_\_\_\_ Location \_\_\_\_\_ At \_\_\_\_\_

License Number	Driver		Mid Front		R Front		L Rear		Mid Rear		R Rear	
	Belts	Sex	Age	Belts	Sex	Age	Belts	Sex	Age	Belts	Sex	Age
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F
	L	S	M	P	Y	M	O	N	A	F	M	O
	N	F	M	O	N	A	F	M	O	N	A	F

Restraint Use

L = Lap  
S = Shoulder  
N = None  
A = Approved Child Seat

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 and Up)

Figure 1. Safety belt usage survey form.

This survey was the fifth in the series and the second conducted during summer months, the first three having been conducted during February. The series was originally designed to determine whether there were fluctuations over time in the percentages of persons using seat belts and shoulder straps. The fourth survey was conducted during June 1977 and 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. Subsequent to 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 survey was the passage of Senate Bill 413 during the 1982 session of the Virginia General Assembly. This statute is referred to as the Child Safety Seat Law and went into effect January 1, 1983. Therefore, during June 1983, nearly 6 months after the effective date of the statute, 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.

Because the data obtained in 1977 were the most recent available, prior to the 1983 survey, they are used here as the baseline against which the 1983 data are compared. Of primary interest in the comparisons are changes in the use of safety devices for infants, because these changes might be ascribed primarily to the passage of the Child Safety Seat Law.

#### ANALYSIS

During the nine-day survey period in June 1983, data were collected on 9,737 occupants of 6,498 vehicles. The 1977 figures encompassed 6,479 occupants in 4,118 vehicles. Data on the number and percentages of individuals surveyed by time period, age of the automobile, area of the state, sex of the occupant, and age of the occupant are presented in Appendix Tables A-1 through A-5 and are discussed immediately below.

Approximately one-third of the 1977 survey data were collected during each of the three time periods: morning (34.3%), midday (34.7%), and afternoon (31.1%) (see Appendix Table A-1). For the 1983 survey, these percentages were 26.8% in the morning, 34.3% in the midday period, and 38.9% in the afternoon period. Essentially there was no difference in the midday percentages for each survey year, but during 1983, a greater percentage of vehicles were surveyed in the afternoon period, and correspondingly fewer in the morning period, than were surveyed in 1977.

The 1977 survey results found the greatest percentages of vehicles in the 1972-1975 (41.3%), the 1963-1971 (36.7%), and the 1976-1977 (20.6%) vehicle age groups (see Appendix Table A-2). The 1983 survey results showed that 68.5% of all surveyed vehicles were in the 1976-1984 age group. The other age categories with significant numbers of vehicles were the 1972-1975 (19.4%) and the 1963-1971 (11.9%) groups. These percentages are understandable in light of the years in which the data were collected and the number of model years contained in each of the vehicle age categories.

Appendix Table A-3 contains data on the percentages of vehicles surveyed in each of the four areas of the state. During 1977, the fewest vehicles were surveyed in the eastern area (22.6%), the most were in the central area (26.8%), and nearly one-fourth each in the western (25.9%) and northern (24.8%) areas. For the 1983 survey, the fewest vehicles surveyed were in the western area (20.1%) and the most were in the northern area (31.8%). There was little difference between the 1977 and 1983 survey results in the percentages of vehicles in the central and eastern areas of the state. The greater number of vehicles in the northern area in 1983 is explainable by the fact that the survey covered three days in that area and only two days in the other three areas.

The data on the sex of the occupant in Appendix Table A-4 show very little difference in the percentages of male and female drivers and passengers between the two surveys. In both, slightly over 53% of the drivers, 32% of the right front passengers (RFP), and 41% of the remaining passengers (RP) were male.

Appendix Table A-5 contains data on the age of the occupants according to vehicle seating position. There were slight differences in the ages of the drivers and passengers in the two surveys. In 1977, 62.8% of the drivers were in the middle adult (31-60 years) age group and 32.3% were in the young adult (17-30 years) group, while the 1983 figures were 69.0% and 27.5%, respectively. For RFPs, the proportion of occupants were 41.1% vs. 48.3% for middle adults, 26.0% vs. 26.9% for young adults, and 20.3% vs. 14.5% for pre-adults during the 1977 and 1983 surveys. These three age categories accounted for nearly 90% of the RFPs surveyed. The age distributions for the remaining passengers were primarily in the younger age groups, with infants (16.4% vs. 23.7%) and pre-adults (57.8% vs. 42.9%) accounting for over two-thirds of these during both surveys.

While there were differences in several of the sets of data when categorized according to time period, location, and sex and age of the occupant, for the most part the persons and vehicles observed during the two surveys had relatively similar characteristics.

Table 1 presents data on the use of safety belts. While there was no change in the overall use of belts by drivers between the two surveys (16.3% vs. 16.4%), there was a significant change in the type of belt system used. In 1977 most drivers used only lap belts (9.4%), but in 1983 most drivers used the combination lap/shoulder belts (14.4%). For RFPs, overall safety belt use increased from 9.8% in 1977 to 16.2% in 1983. The greatest change was the increase in the use of lap/shoulder belts from 3.8% to 12.1%, which was accompanied by a drop from 5.5% to 2.5% in the use of lap belts only. For RPs, the use of safety belts increased from 3.4% in 1977 to 23.6% in 1983. This increase resulted primarily from a significant increase from 1.4% in 1977 to 15.7% in 1983 in the use of child restraints. While these increases in passenger (RFP and RP) use are encouraging, it can readily be seen that most vehicle occupants do not use safety belts and that more needs to be done to increase the usage rates by Virginia motorists.

Table 1

Use of Seat Belts

<u>Occupant Seat Position</u>	<u>Restraint Used</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	Lap Only	389	9.4	132	2.0
	Lap/Shoulder	283	6.9	936	14.4
	None	3,446	83.7	5,427	83.6
Right Front Passenger	Child Seat	7	0.5	33	1.6
	Lap Only	77	5.5	51	2.5
	Lap/Shoulder	54	3.8	246	12.1
	None	1,269	90.2	1,700	83.7
Remaining Passengers	Child Seat	13	1.4	190	15.7
	Lap Only	19	2.0	82	6.8
	Lap/Shoulder	0	-	13	1.1
	None	922	96.6	922	76.4

Data on the association between driver and passenger use of safety belts are presented in Table 2. During the 1977 survey, when the drivers were not using belts, 96.7% of the RFPs and 98.3% of the RPs also were not using them. During the 1983 survey, there was little practical change in usage rates by RFPs. In cars whose drivers were not using belt systems, 94.6% of the RFPs were not using them. However, for RPs there was a significant increase in child seat use from 0.9% to 13.9% and an increase from 0.9% to 3.4% in the use of other belt systems.

Table 2

## Association Between Driver and Passenger Use of Seat Belts

Occupant Seat Position	Occupant Use Of Belts	When Driver Not Using Belts			
		1977		1983	
		Number	Percent	Number	Percent
Right Front Passenger Using	Child Seat	4	0.3	25	1.5
	Lap Only	18	1.5	17	1.0
	Lap/Shoulder	18	1.5	50	3.0
	None	1,166	96.7	1,598	94.6
Remaining Passenger Using	Child Seat	7	0.9	139	13.9
	Lap Only	7	0.9	31	3.1
	Lap/Shoulder	0	-	3	0.3
	None	809	98.3	830	82.8
Occupant Seat Position	Occupant Use Of Belts	When Driver Using Only Lap Belts			
		1977		1983	
		Number	Percent	Number	Percent
Right Front Passenger Using	Child Seat	2	1.6	0	-
	Lap Only	48	38.7	25	67.6
	Lap/Shoulder	5	4.0	2	5.4
	None	69	55.7	10	27.0
Remaining Passenger Using	Child Seat	2	2.5	4	16.0
	Lap Only	9	11.3	8	32.0
	Lap/Shoulder	0	-	0	-
	None	69	86.3	13	52.0
Occupant Seat Position	Occupant Use Of Belts	When Driver Using Lap & Shoulder Belts			
		1977		1983	
		Number	Percent	Number	Percent
Right Front Passenger Using	Child Seat	1	1.3	8	2.7
	Lap Only	11	14.3	9	3.0
	Lap/Shoulder	31	40.3	194	64.5
	None	34	44.2	90	29.9
Remaining Passenger Using	Child Seat	4	7.8	46	25.8
	Lap Only	3	5.9	43	24.2
	Lap/Shoulder	0	-	10	5.6
	None	44	86.3	79	44.4

In 1977, when drivers were using only lap belts, 38.7% of the RFPs were also using lap belts and 4.0% were using lap/shoulder belts. The 1983 figures show that 67.6% of the RFPs were using lap belts and 5.4% using lap/shoulder belts when riding in cars in which the driver was using lap belts. Also, belt use by the RPs increased from 13.8% in 1977 to 48.0% in 1983.

The most dramatic changes in usage rates of passengers occurred in vehicles with drivers who were using both the lap and shoulder belts. The overall RFP rate increased from 55.9% to 70.2% and was primarily the result of a significant increase in the use of lap/shoulder belts during 1983. The total use rate for RPs quadrupled between the two survey periods, from 13.7% to 55.6%. In 1983, 25.8% of all RPs were in child restraints and 29.8% were using other restraint systems.

Other than the significant increase in the use of child restraints by RPs, the most interesting conclusion from the data in Table 2 is that as drivers progressively increased their own driving safety through the use of lap and lap/shoulder belts, there was also an increase in the use of the same safety devices by the passengers. Associated use rates in 1983 were much higher than in 1977; for RFPs the results are due to greater use of lap/shoulder belt systems and for RPs to the greater use of child restraints and lap belts.

While the 1983 data indicate a significant increase in the association of driver and passenger use of safety belts, a cause for concern is revealed by the data that shows so few people in each category use belts. These data do indicate that if through some means one occupant can be convinced to use safety belts, then there is an increased probability that other passengers will also use them.

There are no 1977 data comparable to those in Table 3. The focus of these data is a determination of whether drivers and passengers use restraint systems when infants are in the vehicle. If the infant was not in a child seat, only 4.6% of the drivers, 9.8% of the RFPs, and 8.7% of the RPs were using a restraint system. If the infant was in a child seat, 25.1% of the drivers, 17.2% of the RFPs, and 23.1% of the RPs were belted in some manner. These data indicate a positive trend in safety belt use. When the driver (or a passenger) complies with the state statute and has the infant properly restrained, there is nearly a 23% chance that other vehicle passengers will use safety devices. When the infant is not in a child seat, there is only an 8.0% chance that other passengers will be using safety belts.

The data in Table 4 depict belt use according to the sex of the occupant. There were no real differences in driver use during the two surveys. In 1977, 15.0% of the male and 17.9% of the female drivers were using safety belts, while in 1983, 15.5% of the male and 17.5% of

the female drivers were using them. For RFPs, usage rates increased from 7.9% to 15.0% for males and from 10.7% to 16.9% for females. The most significant changes occurred in the RP seating positions, where the rate increased from 4.1% to 24.0% for males and from 2.7% to 23.4% for females. During both surveys, females were slightly more likely to be using safety devices than were males.

Table 3

Belt Use of Other Occupants In Vehicles With  
Infant Passengers (1983 Only)

Use By Other Occupants		When Infants Were In Child Seats		When Infants Were Not In Child Seats	
		Number	Percent	Number	Percent
Driver	Belted	51	25.1	5	4.6
	Not Belted	152	74.9	104	95.4
Right Front Passenger	Belted	16	17.2	9	9.8
	Not Belted	77	82.8	83	90.2
Remaining Passengers	Belted	18	23.1	16	8.7
	Not Belted	60	76.9	167	91.3

Table 4

Belt Use by Sex of Occupant

Occupant Seat Position	Sex Of Occupant	1977		1983	
		Number	Percent	Number	Percent
Driver	Male	343	15.0	538	15.5
	Female	329	17.9	530	17.5
Right Front Passenger	Male	36	7.9	98	15.0
	Female	102	10.7	232	16.9
Remaining Passengers	Male	18	4.1	120	24.0
	Female	14	2.7	165	23.4

Data on belt use by survey time period are contained in Table 5. There were slight differences in driver use rates during the three daily time periods and between the two years of survey data. Driver use rates were 16.1% vs. 16.5% during the morning, 17.4% vs. 14.5% in the midday period, and 15.4% vs. 18.1% in the afternoon. There were major increases in usage rates in 1983 for both RFPs and RPs during all three time periods. Use rates for RFPs during the 1983 survey were 16.3% (morning), 15.0% (midday), and 17.3% (afternoon), and in 1977 the usage rates were 10.0%, 10.9%, and 8.2%, respectively. The 1983 rates of use for RPs were 35.1% (morning), 20.1% (midday), and 21.3% (afternoon), and in 1977 the usage rates were 2.8%, 3.9%, and 3.3%, respectively.

Table 5

Belt Use by Time Periods

<u>Occupant Seat Position</u>	<u>Period</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	A.M.	227	16.1	287	16.5
	Mid.	248	17.4	324	14.5
	P.M.	197	15.4	457	18.1
Right Front Passenger	A.M.	37	10.0	71	16.3
	Mid.	63	10.9	114	15.0
	P.M.	38	8.2	145	17.3
Remaining Passengers	A.M.	8	2.8	86	35.1
	Mid.	14	3.9	97	20.1
	P.M.	10	3.3	102	21.3

In Table 6, belt use data according to the age of the occupant are presented. The two groups of drivers between the ages of 17 and 60 had nearly the same use rates when surveyed in 1977; 16.7% of the young adults (17 to 30 years) and 16.4% of the middle adults (31 to 60 years) used safety belts. In this same year, 12.1% of the older adults, those over 60 years of age, used belts. During the 1983 survey, 17.3% of the middle adults and 16.3% of the older adults used belts. These rates were higher than those recorded in 1977. In addition, 14.3% of the young adults used safety belts, which was a lower rate than that recorded in 1977.

For every age group, the rate of safety belt use by RFPs was higher in 1983 than in 1977. These rates were marginally higher for young

adults (9.0% vs. 11.0%), slightly higher for middle adults (10.6% vs. 14.7%), 50% higher for older adults (10.0% vs. 15.0%), 3.3 times higher for pre-adults (6.6% vs. 21.8%), and 2.6 times higher for infants (29.7% vs. 76.0%). For all age groups except infants, safety belt usage remained relatively low.

In each occupant age classification, persons in the RP positions had the lowest rates of safety belt use. While the usage rates were higher in 1983 than in 1977, so few young, middle, or older adult RPs were observed to use safety belts during both surveys as to produce nearly meaningless results. No rate exceeded 5.0% and no count exceeded 7 persons. The results were very different for the other two age categories. The pre-adult rate increased 8.7 times from 1.8% to 15.7% and the infant rate increased 6.5 times from 10.2% to 66.8%.

It is evident from the 1983 survey data that some event caused major changes in safety restraint usage rates for infant passengers. The only factor that could have had such a significant effect was the passage of the Child Safety Seat Law.

Table 6

Belt Use by Age of Occupant

<u>Occupant Seat Position</u>	<u>Age of Occupant</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	Pre-Adult	2	20.0	0	-
	Young Adult	222	16.7	254	14.3
	Middle Adult	425	16.4	777	17.3
	Older Adult	23	12.1	37	16.3
Right Front Passenger	Infant	11	29.7	38	76.0
	Pre-Adult	19	6.6	64	21.8
	Young Adult	33	9.0	60	11.0
	Middle Adult	61	10.6	144	14.7
Older Adult	Older Adult	14	10.0	24	15.0
	Infant	16	10.2	191	66.8
	Pre-Adult	10	1.8	81	15.7
	Young Adult	1	1.2	7	3.7
Middle Adult	Middle Adult	3	2.7	4	2.3
	Older Adult	2	4.2	2	5.0

Data on safety belt use by occupant seat position and vehicle age are presented in Table 7. Driver use rates dropped from 11.9% in 1977 to 6.9% in 1983 for the 1963-1971 model year cars and from 20.7% to 14.2% for the 1972-75s, but increased from 9.1% to 15.8% for the pre-1963 cars and from 15.9% to 18.8% for the 1976 through 1984 model year cars. Because of the significant change in the distribution of ages of the vehicles, these individual changes in usage patterns resulted in no change in the overall use of safety belts by drivers (see Table 1).

For cars manufactured since 1963, RFP safety belt use rates in both 1977 and 1983 increased as the vehicle model classification became newer. The exception to this occurred for 1976-1977 model year cars surveyed in 1977. The 1983 survey data also indicate that RFP safety belt use was higher than that observed in 1977 in each vehicle age classification. These increases in belt use were from 6.2% to 8.2% for the 1963-1971s, 12.8% to 14.1% for the 1972-1975s, and 10.9% to 18.3% for the 1976-1984 group. The highest rate of use, 18.3%, was observed during the summer of 1983 and occurred in 1976-1984 model year cars, the vehicle age group which contained the most vehicles surveyed.

For survey data obtained in 1977, RP use rates increased with the recency of vehicle manufacture. These rates ranged from less than 2.0% use by RP occupants of 1963-1971 model year cars to a high of 5.0% use by RP occupants of 1976-1977 model year cars. The use rates observed during the 1983 survey were greater in each vehicle age classification. These rates ranged from 15.9% of the RPs in 1963-1971 cars to 25.1% of the RPs in 1976-1984 cars. The significance of this "new" car use rate is that these vehicles accounted for more than two-thirds of all vehicles and two-thirds of the RPs surveyed in 1983.

Safety belt use data tabulated by sex and age of the occupant in Table 8 show that young and middle adult female drivers used safety belts at a greater rate than did their male counterparts during both the 1977 and 1983 surveys. For older adult drivers, males had a higher use rate than did females during both years. There were too few pre-adult drivers or belt users to allow meaningful comparisons. A more significant factor than male/female differences is that the data show that belt use in 1983 was higher for both males and females in every age category, with the exception of young adult males. The use rate for these young male drivers decreased from 14.6% to 12.4%. This is an important change in usage because young males are the most risk prone of all driver age/sex categories. The rates for middle and older adult male drivers increased from 15.4% and 12.7% to 16.5% and 17.3%, respectively. For young, middle, and older adult female drivers, the rates increased from 18.8%, 17.9%, and 11.3% to 19.0%, 18.3%, and 14.8%. Although the 1983 rates were generally higher, it is important to note that no rate exceeded 20% of the drivers surveyed.

Table 7

## Belt Use By Vehicle Age

<u>Occupant Seat Position</u>	<u>Vehicle Age</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	Pre-63	5	9.1	3	15.8
	63-71	179	11.9	53	6.9
	72-75	353	20.7	178	14.2
	76-84	135	15.9	834	18.8
Right Front Passenger	Pre-63	1	5.0	1	14.3
	63-71	33	6.2	19	8.2
	72-75	74	12.8	60	14.1
	76-84	30	10.9	250	18.3
Remaining Passengers	Pre-63	0	-	0	-
	63-71	7	1.8	21	15.9
	72-75	16	3.9	51	22.9
	76-84	7	5.0	213	25.1

Of those passengers surveyed in 1977 and riding in the right front seat position, young, middle, and older adult females had higher belt use rates than did males of the same age classifications. In addition, male infants and pre-adults had higher use rates than females. The survey data collected during 1983 show that female RFPs had a higher rate of safety belt use than did male RFPs in each of the occupant age classifications. In addition, the 1983 use rates for both male and female RFPs were higher than the 1977 rates in every age group. The highest rates of use by RFPs were for infants; these rates increased from 31.3% and 28.6% in 1977 to 73.7% and 77.4% in 1983 for males and females, respectively. The other significant increases occurred for pre-adult males, 7.7% to 21.4%, and pre-adult females, 5.4% to 22.2%. Other 1983 use rates were 16.3%, 15.4%, and 12.8% for older, middle, and young adult females, and 12.7%, 9.7%, and 7.7% for middle, older, and young adult males.

Use rates were also computed for the various age and sex categories of passengers in the remaining seats. A review of Table 8 indicates just how few young, middle, or older adult RPs were using safety belts. In fact, so few of these occupants were using belts as to make percentages relatively meaningless. There were, however, significant increases in restraint usage rates for infant passengers, both male and female. These rates increased from 9.8% to 72.5% for males and from 10.8% to 63.8% for females. There was also an increase in usage rates by pre-adults, from 2.6% to 16.5% for males and from 1.1% to 14.8% for females.

Table 8

## Belt Use by Sex and Age of Occupant

<u>Occupant Seat Position</u>	<u>Age of Occupant</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
<u>MALES:</u>					
Driver	Pre-Adult	2	25.0	0	-
	Young Adult	97	14.6	107	12.4
	Middle Adult	230	15.4	407	16.5
	Older Adult	14	12.7	24	17.3
Right Front Passenger	Infant	5	31.3	14	73.7
	Pre-Adult	12	7.7	34	21.4
	Young Adult	6	5.2	15	7.7
	Middle Adult	12	8.6	32	12.7
	Older Adult	1	3.3	3	9.7
Remaining Passengers	Infant	9	9.8	71	72.5
	Pre-Adult	7	2.6	45	16.5
	Young Adult	1	2.9	3	4.8
	Middle Adult	0	-	1	1.7
	Older Adult	1	9.1	0	-
<u>FEMALES:</u>					
Driver	Pre-Adult	0	-	0	-
	Young Adult	125	18.8	147	19.0
	Middle Adult	195	17.9	370	18.3
	Older Adult	9	11.3	13	14.8
Right Front Passenger	Infant	6	28.6	24	77.4
	Pre-Adult	7	5.4	30	22.2
	Young Adult	27	10.8	45	12.8
	Middle Adult	49	11.2	112	15.4
	Older Adult	13	11.8	21	16.3
Remaining Passengers	Infant	7	10.8	120	63.8
	Pre-Adult	3	1.1	36	14.8
	Young Adult	0	-	4	3.1
	Middle Adult	3	3.5	3	2.6
	Older Adult	1	2.7	2	6.3

Table 9 presents data on belt use according to the area of the state surveyed. There was no real difference in driver use of safety belts in the Northern Virginia survey area (22.2% vs. 22.7%), but there was a 10% increase in the eastern area (13.7% to 15.1%). Observed belt use declined by 22% in the western area (14.5% to 11.3%) and by 5% in the central area (14.7% to 13.9%). In both surveys, a greater percentage of Northern Virginia drivers used safety belts than did drivers in the other three areas of the state. While there were variations in usage rates within each of the four regions surveyed, they combined to produce no change in the overall state driver usage rate (see Table 1 discussion).

Observed safety belt use by RFPs was significantly greater in all four survey areas in 1983 than in 1977. Usage increased by just over 50% in the western (9.0% to 13.5%) and northern (13.7% to 20.9%) areas, by over 60% in the central area (9.0% to 14.5%), and by over 80% in the eastern area (7.7% to 14.2%). Although 1983 RFP belt use in each area was greater than in 1977, these data indicate that belt use by these passengers remains very low throughout the state.

For RPs, the 1983 data show significant increases in safety belt use in all four areas of the state. These rates increased by nearly six times the 1977 rates in the western (4.1% to 23.8%), northern (3.4% to 21.7%), and central (4.2% to 25.8%) survey areas, and by nearly 11 times in the eastern area (2.2% to 24.0%). While these increases are encouraging, the fact remains that less than one-fourth of the remaining passengers in all vehicles in the state were using safety devices.

Table 9

Belt Use By Area Suveyed

<u>Occupant Seat Position</u>	<u>Survey Area</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	Western	155	14.5	148	11.3
	Northern	226	22.2	468	22.7
	Central	162	14.7	232	13.9
	Eastern	129	13.7	220	15.1
Right Front Passenger	Western	33	9.0	53	13.5
	Northern	48	13.7	135	20.9
	Central	29	9.0	65	14.5
	Eastern	28	7.7	77	14.2
Remaining Passengers	Western	10	4.1	54	23.8
	Northern	8	3.4	81	21.7
	Central	8	4.2	68	25.8
	Eastern	6	2.2	82	24.0

In Appendix Table B-1, data are presented on the use of safety belts according to the age of the vehicle, occupant age, and seat position of the occupant. In each of the four vehicle age categories, there were so few pre-adult drivers using safety belts that the percentages provide little useful information. Use rates for young adult drivers of 1963-1971 and 1972-1975 model year vehicles dropped from 12.8% in 1977 to 4.9% in 1983 and from 20.1% to 9.5%, respectively. There was little effective change in the usage pattern of young adult drivers of 1976-1984 vehicles (18.5% vs. 17.8%) during the two surveys. For middle adult drivers, safety belt usage decreased from 12.0% in 1977 to 8.1% in 1983 for operators of 1963-1971 cars and from 21.1% to 15.6% for drivers of 1972-1975 cars. Middle adult drivers of 1976-1984 model year cars had an increase in usage from 14.6% to 19.2%. Older adult driver use rates rose from 3.7% to 5.9% and from 18.5% to 21.4% for the 1963-1971 and the 1972-1975 model year cars. There was no change in the usage rates by older adult drivers of 1976-1984 vehicles (16.7% vs. 16.8%).

In the two older vehicle age classifications, the pre-1963s and the 1963-1971s, the number of RFPs observed using safety belts was very low each year the data were collected. The number of belt users exceeded five persons each year in only one of the ten vehicle/occupant age groups. In this case, the change in usage rate involved only three persons. Changes in use rates for RFPs of 1972-1975 cars were mixed. During the 1983 survey, there were very large increases over the 1977 rates for infants and pre-adults and relatively small decreases for young, middle, and older adults. Significant increases in both the numbers and rates of safety belt use occurred during the 1983 survey in the newest class of cars, those from the 1976-1984 model years. The greatest changes were for infants and pre-adults, where over 76% of the infants and nearly 25% of the pre-adults were using safety restraints during the latter survey. In addition, each of the other three occupant age groups had an increase in safety belt use. During the latter survey, nearly 14% of the young adults, 16% of the middle adults, and 17% of the older adults were using belt systems.

In the 20 classifications of data by model year and occupant age, the 1977 survey data indicated only two categories where the number of RPs using safety restraints exceeded five persons. These categories were pre-adults in 1972-1975 and infants in 1976-1977 model year vehicles. In the same classifications of 1983 survey data, there were six categories of data where the number of RPs using safety restraints exceeded five persons. Three of these cases involved infants and two pre-adults. In the 1972-1975 and 1976-1984 vehicle age classifications, infant use rates exceeded two-thirds of those surveyed. This pattern of usage by vehicle ages is consistent with the overall use rates noted in the discussion of Table 6.

Data on safety belt use according to vehicle age, area of the state surveyed, and occupant seat position are contained in Appendix Table B-2. The 1983 data indicate that in each of the four areas of the state there were significant decreases in the use of safety belts by drivers in the 1963-1971 and the 1972-1975 categories of cars. These decreases in usage ranged from 23% by central drivers of 1972-1975 model year cars to 60% by western drivers of 1963-1971 model year cars. The results for vehicles in the 1976-1984 model years were mixed. Northern and eastern drivers had increases in 1983 belt use of 27% and 31%, respectively. There was an 8% decrease in 1983 usage by central drivers and effectively no change by western drivers of these same model year vehicles. The 1983 data also indicate that a greater percentage of drivers in the northern survey area used safety belts in all four of the vehicle age classifications. Generally, drivers of the 1976-1984 cars had the highest rates of belt use. This car category also accounted for most of the vehicles surveyed and by far the greatest number of safety belt users.

For the two categories of vehicles older than the 1972 model year, the RFP safety belt users were so few that percentages of use can not provide an adequate representation of changes in usage patterns. In the eight remaining vehicle age/survey area classes of cars, increases in belt use occurred in 7 cases and a decrease in 1. During 1977, there was only one instance where safety belt usage exceeded 15% of the RFPs surveyed. During the 1983 survey, there was one instance where usage exceeded 20% and five others where the rate was in excess of 15%. In general, RFP use rates were higher during 1983 and higher for the newest class of cars. The highest rate of use during 1977 was 15.2% by northern RFPs of 1976-1977 cars; the lowest, zero, was shared by a number of model year/survey area categories. In 1983, the highest rate of use, 23.2%, was also by northern RFPs in 1976-1984 cars; the lowest, zero, was shared by several older model year categories.

Both the counts of RP occupants and the counts of RP safety belt users were very low in the 8 vehicle age/survey area categories of data for vehicles older than the 1972 model year. 1983 use rates were from 2 to 9 times higher than the 1977 rates in the 8 vehicle age/survey area categories of vehicles newer than the 1972 model year. During the 1977 survey, only 3 of the 16 vehicle age/survey area data categories had safety belt use in excess of 5% of the RPs. In the 1983 survey, 8 of the 16 categories exceeded 20% safety restraint use and 2 of these exceeded 30% use. In general, 1983 RP use rates were higher than 1977 rates and the rates were higher for the newer cars.

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Appendix Table A-1

Time Period Data

<u>Time Period</u>	<u>1977</u>		<u>1983</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Morning	1,412	34.3	1,739	26.8
Midday	1,427	34.7	2,229	34.3
Afternoon	1,279	31.1	2,530	38.9

Appendix Table A-2

Vehicle Age Data

<u>Vehicle Age</u>	<u>1977</u>		<u>1983</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Pre-1963	55	1.3	19	0.3
63-71	1,511	36.7	772	11.9
72-75	1,703	41.3	1,257	19.4
76-84	849	20.6	4,450	68.5

Appendix Table A-3

Location Data

<u>Location</u>	<u>1977</u>		<u>1983</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
Western	1,066	25.9	1,307	20.1
Northern	1,019	24.8	2,067	31.8
Central	1,102	26.8	1,670	25.7
Eastern	931	22.6	1,454	22.4

Appendix Table A-4

## Sex of Occupant Data

<u>Occupant Seat Position</u>	<u>Sex of Occupant</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	Female	1,837	44.6	3,034	46.7
	Male	2,281	55.4	3,464	53.3
Right Front Passenger	Female	949	67.5	1,377	67.8
	Male	458	32.5	655	32.2
Remaining Passengers	Female	518	54.2	707	58.6
	Male	436	45.8	500	41.4

Appendix Table A-5

## Age of Occupant Data

<u>Occupant Seat Position</u>	<u>Age of Occupant</u>	<u>1977</u>		<u>1983</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Driver	Pre-Adult	10	0.2	0	-
	Young Adult	1,331	32.3	1,785	27.5
	Middle Adult	2,587	62.8	4,486	69.0
	Older Adult	190	4.6	227	3.5
Right Front Passenger	Infant	37	2.6	50	2.5
	Pre-Adult	286	20.3	294	14.5
	Young Adult	366	26.0	547	26.9
	Middle Adult	578	41.1	981	48.3
Remaining Passengers	Older Adult	140	10.0	160	7.9
	Infant	157	16.4	286	23.7
	Pre-Adult	551	57.8	518	42.9
	Young Adult	86	9.0	190	15.7
Middle Adult		112	11.7	173	14.3
	Older Adult	48	5.0	40	3.3

Appendix Table B-1

## Belt Use by Vehicle and Occupant Ages

Vehicle Age	Occupant Seat Position	Age of Occupant	1977		1983	
			Number	Percent	Number	Percent
Pre- 1963	Driver	Pre-Adult	0	-	0	-
		Young Adult	0	-	0	-
		Middle Adult	3	11.1	3	21.4
		Older Adult	2	28.6	0	-
	Right Front Passenger	Infant	0	-	0	-
		Pre-Adult	0	-	0	-
		Young Adult	0	-	0	-
		Middle Adult	1	20.0	1	20.0
		Older Adult	0	-	0	-
	Remaining Passengers	Infant	0	-	0	-
		Pre-Adult	0	-	0	-
		Young Adult	0	-	0	-
		Middle Adult	0	-	0	-
	1963- 1971	Driver	Pre-Adult	1	20.0	0
Young Adult			64	12.8	13	4.9
Middle Adult			111	12.0	38	8.1
Older Adult			3	3.7	2	5.9
Right Front Passenger		Infant	4	26.7	3	50.0
		Pre-Adult	4	3.7	2	5.3
		Young Adult	7	5.2	2	2.8
		Middle Adult	14	6.9	11	10.4
		Older Adult	4	6.4	1	10.0
Remaining Passengers		Infant	5	7.7	17	53.1
		Pre-Adult	1	0.5	4	7.0
		Young Adult	1	2.4	0	-
		Middle Adult	0	-	0	-
		Older Adult	0	-	0	-

Appendix Table B-1 Continued

Vehicle Age	Occupant Seat Position	Age of Occupant	1977		1983		
			Number	Percent	Number	Percent	
1972- 1975	Driver	Pre-Adult	1	25.0	0	-	
		Young Adult	107	20.1	33	9.5	
		Middle Adult	233	21.1	133	15.6	
		Older Adult	12	18.5	12	21.4	
	Right Front Passenger	Infant	7	38.9	9	90.0	
		Pre-Adult	12	9.7	14	22.6	
		Young Adult	16	11.2	10	8.1	
		Middle Adult	32	13.1	24	12.2	
	Remaining Passengers	Older Adult	7	14.3	3	9.1	
		Infant	3	5.0	39	68.4	
		Pre-Adult	8	3.4	11	10.4	
		Young Adult	0	-	0	-	
	1976- 1984	Driver	Middle Adult	3	6.1	1	4.0
			Older Adult	2	6.7	0	-
Pre-Adult			0	-	0	-	
Young Adult			51	18.5	208	17.8	
Right Front Passenger		Middle Adult	78	14.6	603	19.2	
		Older Adult	6	16.7	23	16.8	
		Infant	0	-	26	76.5	
		Pre-Adult	3	7.5	48	24.8	
Remaining Passengers		Young Adult	10	12.7	48	13.8	
		Middle Adult	14	11.1	108	16.1	
		Older Adult	3	11.5	20	17.1	
		Infant	8	28.6	135	68.2	
Remaining Passengers		Pre-Adult	1	1.2	66	18.8	
		Young Adult	0	-	7	5.0	
	Middle Adult	0	-	3	2.4		
	Older Adult	0	-	2	6.3		

Appendix Table B-2

## Belt Use by Vehicle Age and Area Surveyed

Vehicle Age	Occupant Seat Position	Survey Area	1977		1983	
			Number	Percent	Number	Percent
Pre- 1963	Driver	Western	2	10.5	0	-
		Northern	0	-	1	20.0
		Central	1	6.7	1	20.0
		Eastern	2	14.3	1	20.0
	Right Front Passenger	Western	1	16.7	0	-
		Northern	0	-	0	-
		Central	0	-	1	100.0
		Eastern	0	-	0	-
	Remaining Passengers	Western	0	-	0	-
		Northern	0	-	0	-
		Central	0	-	0	-
		Eastern	0	-	0	-
1963- 1971	Driver	Western	46	10.8	8	4.3
		Northern	68	18.6	25	11.6
		Central	38	10.1	10	5.0
		Eastern	27	7.9	10	6.0
	Right Front Passenger	Western	10	6.6	4	6.9
		Northern	15	11.9	6	9.7
		Central	6	5.6	1	1.8
		Eastern	2	1.3	8	14.3
	Remaining Passengers	Western	2	1.8	5	14.3
		Northern	2	2.3	8	25.8
		Central	1	1.5	2	5.4
		Eastern	2	1.6	7	23.3

Appendix Table B-2 Continued

<u>Vehicle Age</u>	<u>Occupant Seat Position</u>	<u>Survey Area</u>	<u>1977</u>		<u>1983</u>	
			<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
1972- 1975	Driver	Western	82	19.3	35	11.4
		Northern	113	27.1	67	19.4
		Central	84	17.5	42	13.5
		Eastern	74	19.4	34	11.6
	Right Front Passenger	Western	16	10.9	17	16.2
		Northern	21	14.6	19	17.6
		Central	17	11.8	14	16.5
		Eastern	20	13.9	10	7.9
	Remaining Passengers	Western	8	8.2	15	31.3
		Northern	3	2.9	10	18.9
		Central	2	2.2	9	17.0
		Eastern	3	2.6	17	24.6
1976- 1984	Driver	Western	25	12.8	105	13.0
		Northern	45	19.7	375	25.0
		Central	39	16.8	179	15.5
		Eastern	26	13.5	175	17.7
	Right Front Passenger	Western	6	9.5	32	14.0
		Northern	12	15.2	110	23.2
		Central	6	8.8	49	16.0
		Eastern	6	9.2	59	16.5
	Remaining Passengers	Western	0	-	35	24.5
		Northern	3	6.7	63	21.7
		Central	5	13.9	57	33.0
		Eastern	1	3.2	58	23.9