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Abstract

Observational surveys of child safety seat use were conducted at the request of the Transportation Safety Administration of the Department of Motor Vehicles. The present survey was conducted in the four areas of the state with the largest populations. The data were categorized as correct use, incorrect use, and no use for each seat position in the car for children judged by the survey team to require safety seats under state law.

Correct child seat use was higher (51.6%) in the rear seats of cars than in the front seats (40.8%). For the entire car, only 48.9% of the children were in a correctly used child seat, 33.6% of the child occupants were not in a safety seat, and 17.5% of the seats were obviously misused. The data also showed variations in the pattern of use among the four areas of the state.

The rate of incorrect use was probably underestimated by this survey. There is a need to address the problems of non-use and incorrect use through increased education and enforcement efforts on the part of the state and localities.

FINAL REPORT

A DIRECT OBSERVATION OF THE USE OF CHILD SAFETY SEATS IN METROPOLITAN AREAS OF VIRGINIA DURING SUMMER 1993

Charles B. Stoke
Senior Research Scientist

(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

Virginia Transportation Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia Department of Transportation and the University of Virginia)

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ABSTRACT

The Transportation Safety Administration of the Department of Motor Vehicles requested observational surveys of child safety seat use. The present survey was conducted in the four areas of the state with the largest populations. The data were categorized as correct use, incorrect use, and no use for each seat position in the car for children judged by the survey team to require safety seats under state law.

Correct child seat use was higher (51.6%) in the rear seats of cars than in the front seats (40.8%). For the entire car, only 48.9% of the children were in a correctly used child seat, 33.6% of the child occupants were not in a safety seat, and 17.5% of the seats were obviously misused. The data also showed variations in the pattern of use among the four areas of the state.

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INTRODUCTION

Data on the use of safety belts in Virginia were first collected from 1974 through 1977 in the four metropolitan areas of the state: the Roanoke Valley (Western), Richmond/Henrico/Chesterfield (Central), Norfolk/Virginia Beach/ Hampton (Eastern), and Fairfax County/Arlington/ Alexandria (Northern). Data collection was suspended from 1978 to 1982 due to a perceived lack of need by the state's highway safety program for data on belt use. With the passage of the Child Safety Seat Law in 1982 (effective date January 1, 1983), Department of Motor Vehicles officials requested the collection of data on the use of child safety seats and safety belts. A safety belt and child safety seat survey began in March 1983, with additional surveys in June and October 1983. Safety belt and child safety seat use data have been collected at least annually since then.

Over the years, the number of data collection sites has increased to make the data representative of statewide use rates. During the first 8 years (1974-1977 and 1983-1986) 27 sites, strictly in urban areas, were used. In 1987, sites were added in communities with populations below 15,000. In 1990, additional sites were added in the urban areas, and in 1991 sites were added in cities with populations between 50,000 and 100,000. By 1991, there were a total of 50 sites. The number of sites in each area was based on the proportion of the state population that lived in the area surveyed.

The type of data collected has also changed. From 1983 through 1985, child seat use was recorded as "yes" and "no," with the "no" response including incorrect use. From 1986 to the present, child seat use has been recorded as correct use, incorrect use, and no use. In 1991, data collection on the sex of the occupant was discontinued and that for ethnic group was added.

In these surveys, the reported rate of use was influenced by a number of factors, including the way the data were collected and the amount and type of training given to the observers (Figure 1). From 1983-1985, when child seat use was recorded as "yes" and "no," correct use varied from 57.4 percent to 63.9

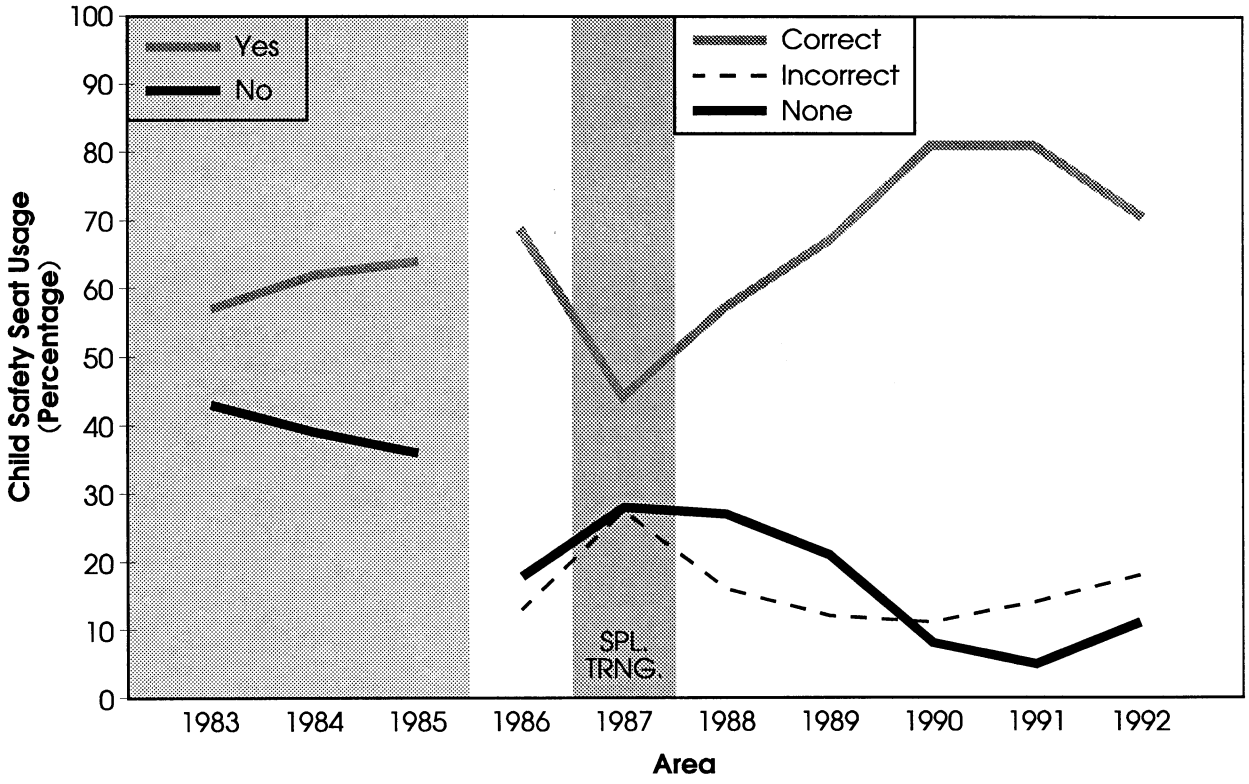

Figure 1. Rates of child safety seat use for the 1983-1992 period.

percent. In 1986, the first year in which incorrect use was recorded separately, correct use was reported at 68.9 percent. In 1987, because the state safety belt task force suspected that the reported rate of correct use was artificially high, a special training program was conducted for the observers which emphasized checking for incorrect use, and the reported rate of correct child seat use dropped to 44.2 percent. While the observers must undergo training every year, there has been no special emphasis on incorrect use since 1987. Over the past 5 years, reported rates for correct child seat use have varied from 57.1 percent to 80.8 percent, with the peak occurring in 1990. In 1992, the highest rate of incorrect use (17.9 percent) was recorded since the special training in 1987.

These were in-traffic surveys and the observers could not enter the vehicles to check for installation characteristics. Only non-use and misuses obvious from outside the vehicle could be determined. This procedure is likely to underestimate incorrect use.

The Transportation Safety Training Center at Virginia Commonwealth University, as part of its training program in correct child seat installation, carried out a number of surveys at shopping centers and day care centers where trainees actually entered the car to check the child seats. These surveys were not intended to be representative of the general population of the state or of the area in which they were conducted. In addition, the Community Traffic Safety

Program in DMV District 5 (Tidewater) has sponsored a number of safety seat checks where the car was entered. These activities also were not designed to be representative of the general Tidewater population. While acknowledging the biases in the data, both groups found an extremely high rate of misuse, with the most common (modal) rate being 88 percent, and with a misuse range from 75 to 94 percent. When it is possible to enter the vehicle to check for correct installation, most child seats are categorized as misused. These data probably overestimate the rate of incorrect use among the general population of the state, because of the manner in which the sites and vehicles were selected.

With the passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), data collection procedures in Virginia were modified to conform to Federal Guidelines. This change was required by the National Highway Traffic Safety Administration (NHTSA) before accepting any statewide use rates as qualifying the state for ISTEA Section 153 incentive funds. The federal guidelines required that data be collected from moving vehicles, in lanes other than the curb lane, at both signalized and non-signalized intersections, and that the use or non-use of the shoulder belt be considered to determine whether the occupant was correctly belted. In making the required changes, the state lost the ability to determine use rates of child safety seats, because in following the federal guidelines a child seat cannot be properly observed.

PURPOSE AND SCOPE

The Department of Motor Vehicles requested that a survey solely of child safety seat use be conducted during the summer of 1993 to determine the rate of use of child safety seats by both front and rear seat occupants who were under four years old and riding in passenger cars. The project was limited to collecting data only in the four metropolitan areas of the state.

METHOD

The child safety seat use data were collected at signalized intersections at 12 sites in the Northern area, 11 in the Eastern area, 7 in the Central area, and 4 in the Western area. The use of shopping centers and day care centers was also considered, but when a sample of these locations was checked at various times of day, they either had inadequate traffic volume or evident socioeconomic bias.

There were two persons on the survey team. Child seat data were collected only from passenger cars in the curb travel lane (dedicated turn lanes were not considered as travel lanes), and no distinction was made between Virginia licensed and out-of-state vehicles (the law makes no distinction between these categories of vehicles). When the passenger cars stopped for the red signal, the observers left the curb and approached the car from the passenger side front fender. As required by state policy, each team member wore a hard hat and an orange vest. Each member of the survey team observed up to 15 cars per traffic light cycle, with traffic volume determining the number of cars surveyed. Because this survey was concerned only with the use of child safety seats, data were collected only from cars that had an occupant of the proper age. Survey team members completed a training program in data collection and how to identify the factors that constituted correct and incorrect use.

Section 46.2-1095 of the Code of Virginia (COV) applies to "a child under the age of four" years. Because this was an in-traffic survey, two indices were used to help determine whether the child occupant was part of the survey population. The first was contained in previous versions of the Code, where required child seat users were defined as weighing 40 lbs. or less. The second was developed as an aid to police officers, where a required child seat user was defined as being 40 inches tall or less. Age, weight, and height factors were included in the training program for survey team members.

Child seat use was recorded as correct (C), incorrect (I), or non-use (N) (Figure 2). Only those features easily identifiable from outside the vehicle were used to determine whether safety seat use was correct or incorrect. These features included the use or non-use of arm bars/shields, assuring that the seat harness was properly clipped between the legs of the child, that the seat was facing in the proper direction for the age of the child, and that the lap/shoulder belt was routed through the child seat. For a response to be recorded as correct, all features had to be used in the correct manner. Misuse or non-use of any one feature required that the use be recorded as incorrect. Non-use was recorded if there was a child of the proper age in the car and no safety seat was present, or a seat was present, but was not being used, or a lap belt was being used in place of a safety seat.

RESULTS

The number of recorded correct, incorrect, and non-users at each site is shown in the Appendix. The individual site data are combined into four separate area totals and the four area totals are combined into a metropolitan total. In addition, data are shown for the total car, the front seat, and the rear seat.

CHILD SAFETY SEAT SURVEY

Summer 1993

Area _____ Site _____ @ _____ Sheet # _____

Vehicle	Front Seats			Back Seats		
	Driver	Middle	Right	Left	Middle	Right
1		C I N	C I N	C I N	C I N	C I N
2		C I N	C I N	C I N	C I N	C I N
3		C I N	C I N	C I N	C I N	C I N
4		C I N	C I N	C I N	C I N	C I N
5		C I N	C I N	C I N	C I N	C I N
6		C I N	C I N	C I N	C I N	C I N
7		C I N	C I N	C I N	C I N	C I N
8		C I N	C I N	C I N	C I N	C I N
9		C I N	C I N	C I N	C I N	C I N
10		C I N	C I N	C I N	C I N	C I N

Figure 2. Child Safety Seat Survey Form — Summer 1993.

In previous reports published by the Virginia Transportation Research Council on the results of safety belt use surveys in Virginia, the correct and incorrect use rates were combined into a total use figure. This was done because law enforcement officials interpret the provisions of Section 46.2-1094 of the COV requiring the use of safety belts to be met by ANY belt use regardless of whether the use is proper or safe. For this report on the use of child safety seats, correct and incorrect uses are NOT combined. Section 46.2-1095 of the COV states that a "child under the age of four [must be] PROPERLY (emphasis added) secured in a child restraint device." By keeping these data elements separate, the severity of the incorrect use problem can be determined, and state programs can be developed to address this traffic safety problem.

Total Car Use

The data in Figure 3 show the rates of child safety seat use in cars with an occupant under four years old. The data are categorized by each metropolitan area surveyed and for all four metropolitan areas combined. When the data for all four metropolitan areas were combined, fewer than half (48.9%) of all children under four years old were observed to be correctly using the required child safety seat. Just over one-third (33.6%) of the child occupants were not

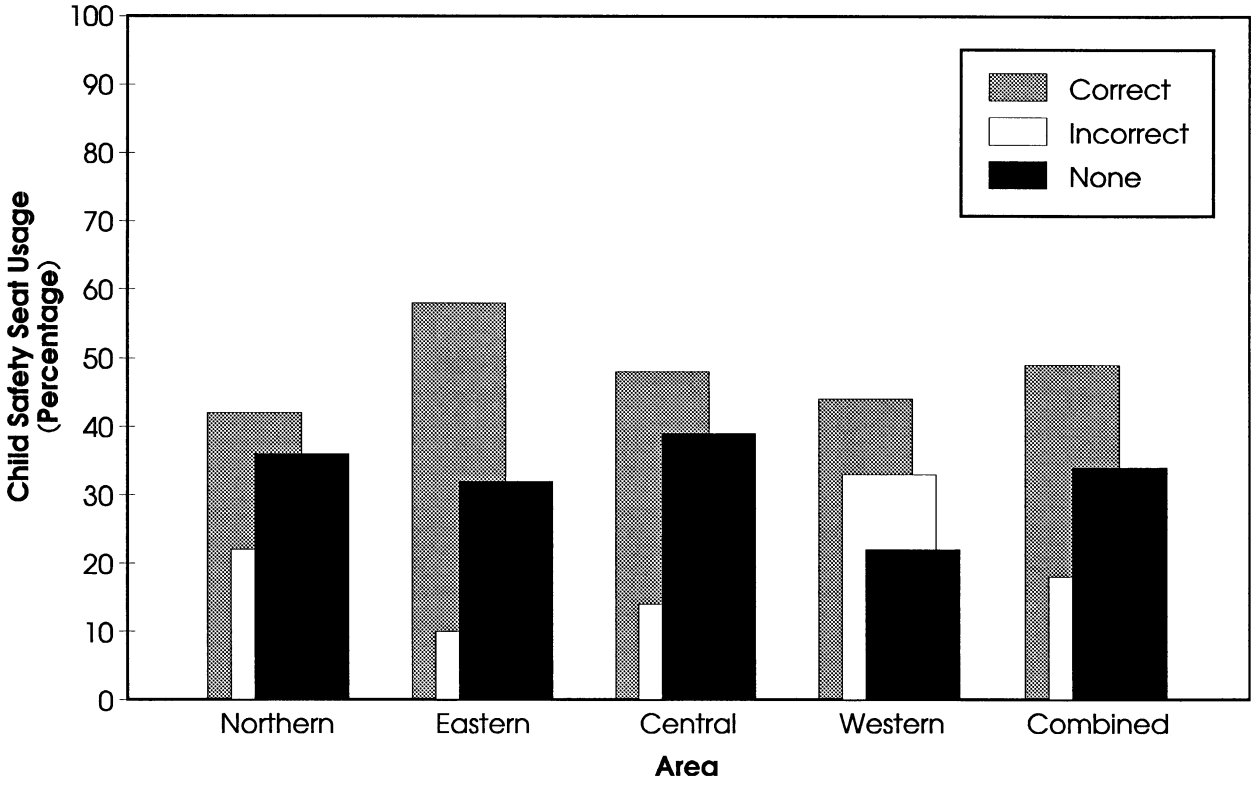

Figure 3. Rates of child seat use for the total vehicle.

using a child safety seat, and incorrect use was 17.5 percent. Because only easily identifiable features were used in making the correct or incorrect use decision, these data probably underestimate the rate of incorrect use.

When the data are considered on the basis of the metropolitan area of the state where the survey occurred, correct use in the Northern, Central, and Western areas varied by fewer than six percentage points, with rates ranging from 41.9 percent to 47.5 percent. Correct use was much higher in the Eastern area (57.5%). The rates of non-use were similar in the Northern, Eastern, and Central areas with rates between 32.4 percent and 38.6 percent. The non-use rate was much lower in the Western area (22.2%). There was more variability between areas in the rate of incorrect use than for rates of correct use and non-use. Incorrect use was 10.1 percent in the Eastern area, 13.9 percent in the Central area, 21.9 percent in the Northern area, and 33.3 percent in the Western area.

Front Seat Use

The data in Figure 4 show the rates of correct, incorrect, and non-use of child safety seats by occupants under four years old riding in the front seats of

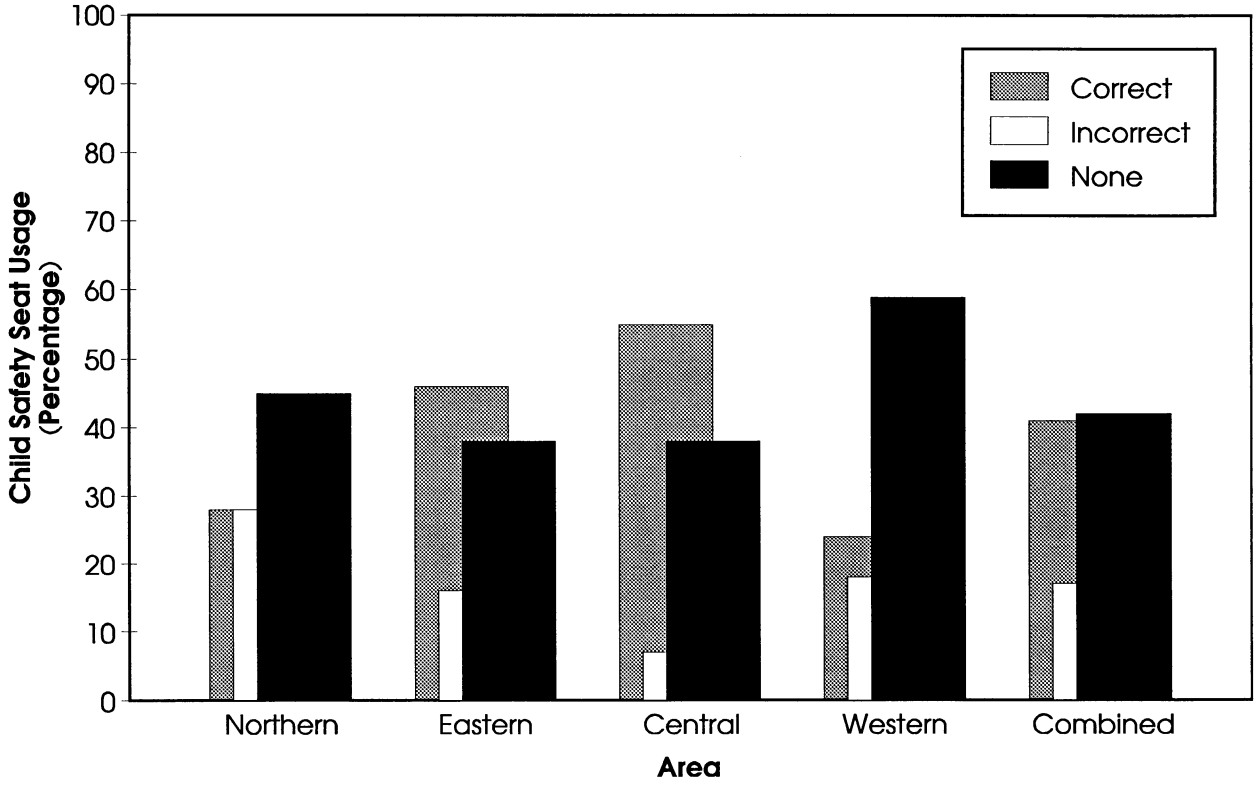

Figure 4. Rates of child seat use for the front seats.

passenger cars. The data are categorized for each of the metropolitan areas and for all four areas combined.

When the data from each of the four metropolitan areas were combined, correct use was 40.8 percent, incorrect use was 16.8 percent, and non-use was 42.4 percent. There was considerable variability between use rates when the data were examined on a geographical basis. The Central area had the highest rate of correct use (55.2%) and the Western area had the lowest rate (23.5%). Correct use was 46.0 percent in the Eastern area and 27.6 percent in the Northern area. When incorrect use was considered, the Northern area had the highest rate (27.6%), the Central area had the lowest rate (6.9%), and the difference in rates of use between the Western (17.7%) and the Eastern (16.0%) areas was small. The non-use data show that the highest rate (58.8%) was in the Western area and the lowest rates were in the Eastern and Central areas (38.0% and 37.9%). Non-use was 44.8 percent in the Northern area.

Three factors are readily apparent from the data. First, fewer than one-fourth of the children under four years old were riding in the front seats of cars, possibly because there has been considerable publicity advocating the placement of children in the rear seats for added safety. Second, over 42 percent of the observed children were not using the required safety seat. Third, for nearly 17 percent of all those observed, the child safety seat was being used in an incorrect manner. Again, the seriousness of this third finding is probably underestimated.

Rear Seat Use

The data in Figure 5 show the rates of child safety seat use in the rear seats of cars. The data are tabulated for each metropolitan area and for all four areas combined.

When the data from each of the four metropolitan areas were combined, correct use was 51.6 percent, incorrect use was 17.7 percent, and non-use was 30.7 percent. When the rear seat data were considered on the basis of the metropolitan area of the state surveyed, correct use varied from 62.0 percent in the Eastern area to 44.4 percent in the Central area. Correct use was 52.2 percent in the Western area and 45.0 percent in the Northern area. Incorrect use was 7.8 percent in the Eastern area, 16.7 percent in the Central area, 20.6 percent in the Northern area, and 39.1 percent in the Western area. Rear seat non-use also varied considerably on a regional basis. The non-use rate was as low as 8.7 percent in the Western area and as high as 38.9 percent in the Central area. Non-use in the other two areas more closely followed the pattern of the Central area; 30.2 percent in the Eastern area and 34.4 percent in the Northern area.

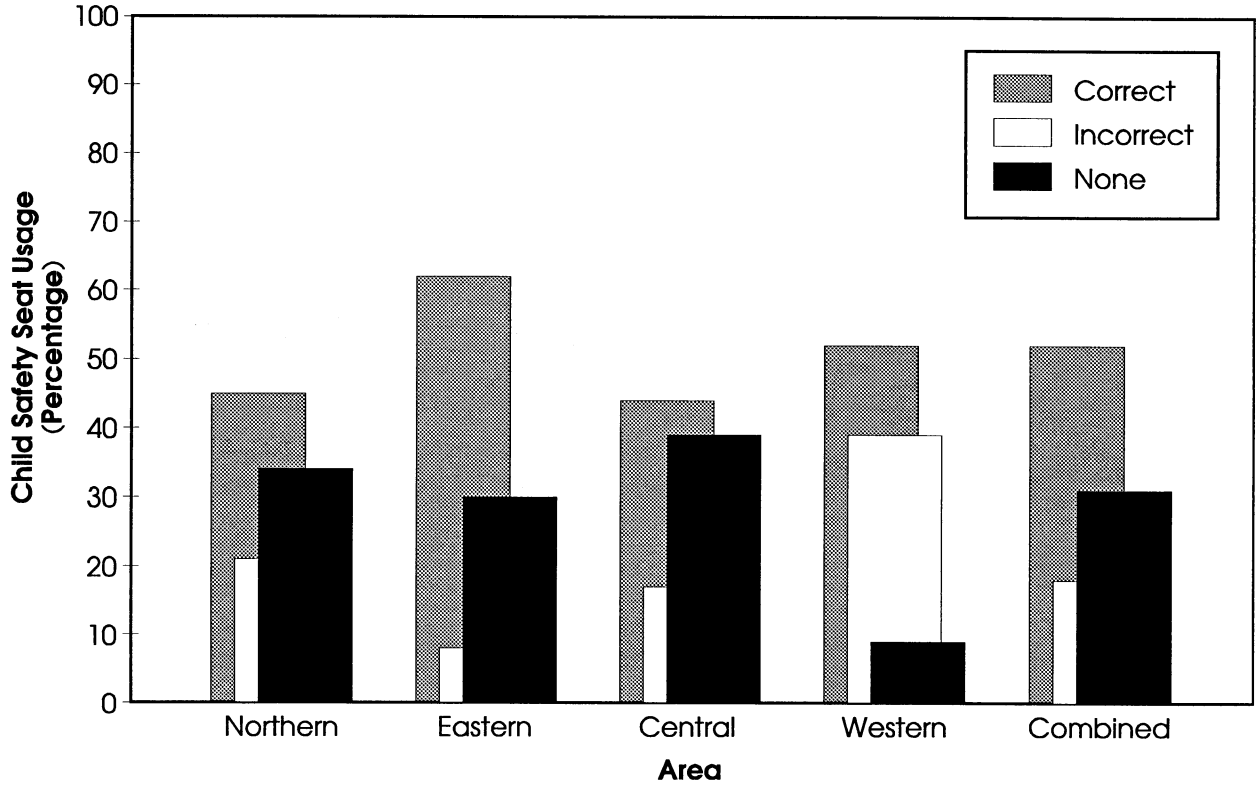

Figure 5. Rates of child seat use for the rear seats.

Three factors are discernible from these data. First, correct child seat use is greater for occupants of the rear seats (51.6%) than for those in the front seats (40.8%). Second, non-use is lower in the rear seats (30.7%) than in the front seats (42.4%). Third, incorrect use is marginally higher in the rear seats (17.7%) than in the front seats (16.8%).

DISCUSSION

In determining the significance of the safety seat data collected since 1986, two issues need to be considered. The first concerns the population from which the survey sample was drawn and how state and federal programs to encourage safety seat use might affect use rates. The second concerns the methods and procedures for data collection and whether the change in use rates since 1991 was an actual drop in rate or was the result of the way the data were collected.

While both federal and state agencies have developed and used a number of safety seat public service announcements and have engaged in other activi-

ties to encourage safety seat use, these programs have been conducted in a fashion that misses a significant portion of the population. Approximately one-fourth of the children subject to the provisions of § 46.2-1095 pass out of the age group each year and are replaced by an entirely new age cohort, significantly changing the population base.

The data show a significant drop in correct use over the past three years and an increase in non-use. As with any study of use rates relying on survey procedures, the question arises whether there was an actual change in rate or whether the survey procedures could account for the change.

In Virginia, the data on safety seat use for 1991-1993 were collected in the same areas of the state, using the same sites (several sites were moved, but to locations within the same traffic stream), the same two observers were used, and the state had few safety seat programs in the first half of 1993. This suggests a real change in rate. There was, however, a change in the survey procedures for 1993. In 1991 and 1992, safety seat use was obtained as part of a larger safety belt survey. In 1993, safety seat use was the sole purpose of the survey. The survey team had much more time to study the installation of the safety seat while the car was stopped and to check for incorrect uses. The change in survey procedures may have accounted for some of the reported change in use rates, although this cannot be quantified.

SUMMARY OF FINDINGS

From the Virginia data collected during the summer of 1993, the findings can be summarized as follows:

- Child safety seat use was higher in the rear seats of cars than in the front seats.
- While nearly two-thirds of the children observed were in a safety seat, fewer than one-half were in a correctly used safety seat.
- More than one-third of these children were not using the required child safety seat.
- In 17.5 percent of the observations, the child safety seat was easily identified as being incorrectly used.
- Correct use was highest in the Eastern area and lowest in the Northern area.
- Incorrect use was lowest in the Eastern area and highest in the Western area.

- Non-use was highest in the Central area and lowest in the Western area.

CONCLUSIONS

- The rate of incorrect use is underestimated, because the survey team was able to identify only the most obvious cases from outside the vehicle.
- Because the observers had more time to carefully check proper use in 1993 (due to the relatively few children observed at each site), the correct use rates reported in this document are lower than the statewide use rates reported for 1991 and 1992.
- There is a need to attack the problems of non-use and incorrect use.

RECOMMENDATIONS

Because of the high rates of non-use and incorrect use of child safety seats, it is recommended that:

- The state implement a comprehensive statewide educational program emphasizing the high rate of non-use, especially in the front seats of cars, and the consequences of not having the child protected by a child safety seat.
- The state, in cooperation with local communities, develop local programs to identify incorrect child seat use and the methods to correct this situation.
- Local education and enforcement efforts should be ongoing. Each year there is a new group of infants, and efforts to educate parents must be conducted continually.

ACKNOWLEDGMENTS

We thank Harold Reavis and Aaron Zdinak, who spent many hours traveling around the state, working from early morning to late afternoon, including weekends, to collect the data used in this report.

APPENDIX

Table 1
1993 Child Safety Seat Survey Results

Site Location	Front Seat			Rear Seat			Total Vehicle		
	C	I	N	C	I	N	C	I	N
Northern									
1	0	3	0	12	4	0	12	7	0
2	1	1	1	2	6	8	3	7	9
3	1	0	2	11	3	10	12	3	12
4	0	0	0	3	2	1	3	2	1
5	0	0	1	6	2	3	6	2	4
6	1	1	1	3	1	2	4	2	3
7	1	0	2	1	0	1	2	0	3
8	0	0	0	3	1	1	3	1	1
9	0	1	0	3	2	3	3	3	3
10	2	1	1	4	1	5	6	2	6
11	2	0	2	9	1	8	11	1	10
12	0	1	3	2	4	3	2	5	6
Northern Area Total	8	8	13	59	27	45	67	35	58
Western									
1	0	0	2	4	1	1	4	1	3
2	1	0	0	2	3	0	3	3	0
3	1	2	5	13	6	1	14	8	6
4	2	1	3	5	8	2	7	9	5
Western Area Total	4	3	10	24	18	4	38	21	14
Central									
1	4	0	2	0	0	10	4	0	12
2	1	1	1	2	1	6	3	2	7
3	4	1	2	8	3	2	12	4	4
4	2	0	3	1	1	7	3	1	10
5	2	0	2	8	3	0	10	3	2
6	2	0	1	10	3	1	12	3	2
7	1	0	0	3	1	2	4	1	2
Central Area Total	16	2	11	32	12	28	48	14	39
Eastern									
1	0	0	0	0	0	0	0	0	0
2	1	1	1	7	0	4	8	1	5
3	3	1	1	15	0	3	18	1	4
4	3	1	4	8	1	5	11	2	9
5	1	1	0	5	1	4	6	2	4
6	7	4	6	12	3	3	19	7	9
7	0	0	0	4	0	5	4	0	5
8	1	0	2	4	2	5	5	2	7
9	6	0	3	14	0	3	20	0	6
10	1	0	0	8	0	1	9	0	1
11	0	0	2	3	3	6	3	3	8
Eastern Area Total	23	8	19	80	10	39	103	18	58
Urban Total	51	21	53	195	67	116	246	88	169