TECHNICAL ASSISTANCE
REPORT

THE USE OF SAFETY RESTRAINT SYSTEMS IN VIRGINIA BY OCCUPANTS UNDER 16 YEARS OF AGE

SUMMER 1997

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Supplementary Notes

Abstract

This series of observational surveys, to determine child safety seat use in Virginia, began in 1993 at the request of DMV officials. During all 4 years (there was no survey in 1995), data in metropolitan areas were collected at the same locations, at the same time of day and day of week, and according to the same criteria for determining use. In 1997, data collection was added for safety restraint use by occupants 4 to 16 years of age at the request of officials of the Department of Health, which is now responsible for the state's child safety seat program. In addition, data were collected on whether any booster seats in use were being used properly. Seven sites were also added in communities with a population between 50,000 and 100,000 (mid-size cities).

For the entire vehicle, the 1997 metropolitan area child safety seat correct use rate was 54.1%, incorrect use was 17.4%, and non-use was 28.5%. Non-use was greater in the front seats (42.1%) than in the rear seats (25.2%). The western area had the highest non-use rate (50.0%) and the lowest correct use rate (32.1%). Non-use and correct use in Northern Virginia, Central Virginia, and Tidewater were similar, with correct use ranging from 53.1% to 58.7% and non-use ranging from 24.8% to 29.1%.

Child safety seat use in the three areas categorized as mid-size cities (Charlottesville, Danville, and Lynchburg) was lower than in the metropolitan areas: correct use was 43.2%, incorrect use was 14.8%, and non-use was 42.0%, with Danville having the highest non-use rate at 61.9%. Non-use was higher in the front seats (66.7%) than in the rear seats (37.7%).

Safety restraint/seat belt use by occupants 4 to 16 years old riding in the rear seats was very low. In the metropolitan areas, correct use was 34.9%, incorrect use was 2.3%, and non-use was 62.9%, with the western area having the highest non-use rate (69.3%). In the mid-size cities, correct use was 26.2%, incorrect use was 1.5%, and non-use was 72.3%, rates considerably worse than in the metropolitan areas, with Danville having a non-use rate of 84.7%.

There was a high correct use rate for booster seats: 83.1% for the entire vehicle, 84.0% for the rear seats, and 77.8% for the front seats.

The recommendations include the initiation of research to determine why child safety seat use is so low, a public information and education effort geared specifically toward child safety seat use, a special education and enforcement effort aimed at occupants 4 to 16 years of age, and frequent and continuous education and enforcement efforts because of changes in the population of the targeted groups.

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

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EXECUTIVE SUMMARY

Virginia's transportation safety officials have tracked the use of child safety restraint systems since 1983. Surveys have been conducted annually, with the exception of 1995, to measure the frequency of use and to make the findings available to publicize the life-saving and injury prevention potential of these devices. The surveys have varied in method and approach, but the principal goal has always been to estimate compliance with the relevant statutes. The surveys from 1983 through 1996 were conducted at the request of officials of Virginia's Department of Motor Vehicles. With the transfer of responsibility for the state's child safety seat program to the Virginia Department of Health (VDH) in 1997, that agency requested that the surveys be continued.

In 1997, child safety seat use data for the metropolitan areas were collected at the same sites, on the same day of the week, and the same hour of day as in previous years. The same criteria for determining correct, incorrect, and no use were used for all surveys since 1993. In response to a request from VDH officials, the number of sites was increased in 1997 to include three localities with a population between 50,000 and 100,000. These localities are referred to as mid-size cities. In addition, VDH officials requested that data be collected on safety belt use by occupants 4 to 16 years of age. This request was made because of changes to §§ 46.2-1094 and 46.2-1095 of the *Code of Virginia,* which required these rear seat occupants to use safety restraints. Finally, VDH requested that data be collected on the use of booster seats.

In this survey, data were collected by two persons at 34 metropolitan sites and seven mid-size city sites for 1.5 hours at each site. Observations were made of 59 booster seats, 565 child safety seats, and safety restraint use by 1,978 occupants 4 to 16 years of age, with 1,038 of the latter group being rear seat occupants.

Because of budgetary considerations, statewide use was not surveyed. This survey does, however, provide snapshots of child restraint system usage in four of the state's most urbanized areas and in three of its mid-size cities. Taken together, they give safety program administrators and public officials a good idea of how well citizens of the Commonwealth are observing the state's laws regarding this important matter and, therefore, how well the laws are working to protect our children. The survey data suggest that Virginia's child passenger safety program is facing both problems and opportunities.

When occupants under age 4 in the metropolitan areas and mid-size cities were considered together, correct child safety seat use was 52.6% (see Figure ES-1). When the rates for incorrect use (17%) and correct use are combined, for nearly 70% of these children, an attempt was being made to restrain them properly. Therefore, roughly 3 of 10 of these children are exposed to the crash risks presented by the so-called second collision—the unrestrained occupant hitting the vehicle's interior.

When the metropolitan and mid-size city use rates for occupants 4 to 16 years of age were considered together, the use rates were worse than those for child safety seats (see Figure ES-2). Less than one half (42.2%) of the occupants affected by the new belt use statutes were in

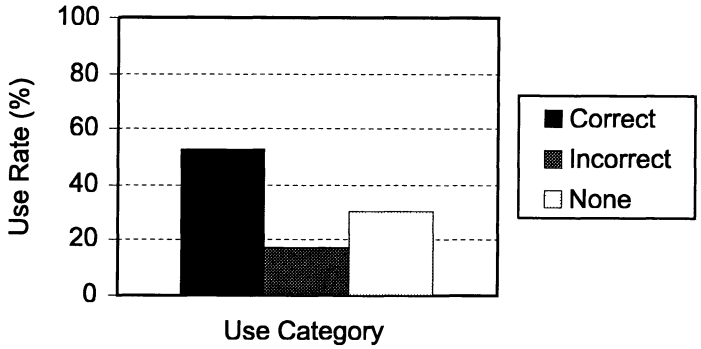

Figure ES-1. Child Safety Seat Use for All Sites Combined

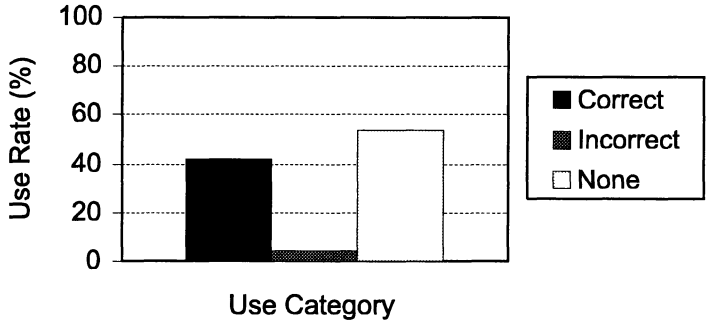

Figure ES-2. Safety Restraint Use by Occupants 4 to 16 Years of Age for All Sites Combined

compliance with the law. In addition, use rates were lower for the rear seats than for the front seats.

Booster seat data were categorized only as correct and incorrect use. Just over 83% were being used correctly (see Figure ES-3).

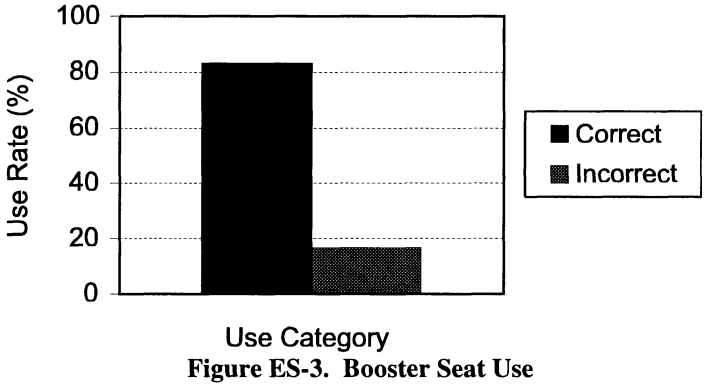

Figure ES-3. Booster Seat Use

Since data for the metropolitan areas were collected in previous years, the 1997 rates can be compared with the rates from 1993, 1994, and 1996 (there was no survey in 1995). Data

collection for the mid-size cities, for booster seats, and for occupants 4 to 16 years of age began in 1997.

For all vehicle seat positions, the 1997 metropolitan area child safety seat correct use was 54.1%, incorrect use was 17.4%, and non-use was 28.5%. Correct use was nearly the same in 1997 as in 1996 (55.0%), whereas incorrect use increased from 8.5% to 17.4% and non-use decreased from 36.5% to 28.5%. The 1997 survey shows that, again, non-use was greater in the front seat (42.1%) than in the rear seat (25.2%). The correct use trend also continued, with the rear seat rate (58.1%) being higher than the front seat rate (37.9%). The rates of correct use are likely to be overestimated, because with an in-traffic survey, the lap/shoulder belt holding the child seat in place cannot be checked for proper tension, a factor identified by other researchers as resulting in a high rate of incorrect use.

The 1997 data also showed variability in patterns of child safety seat use among the four metropolitan areas (see Figure ES-4). Non-use was greatest in the western area (50.0%) and lowest in the northern area (24.8%). Incorrect use varied from 14.1% in the central area to between 17% and 18% in the northern, eastern, and western areas. Correct use was 53.1% in the eastern, 57.7% in the northern, and 58.7% in the central areas but only 32.1% in the western area.

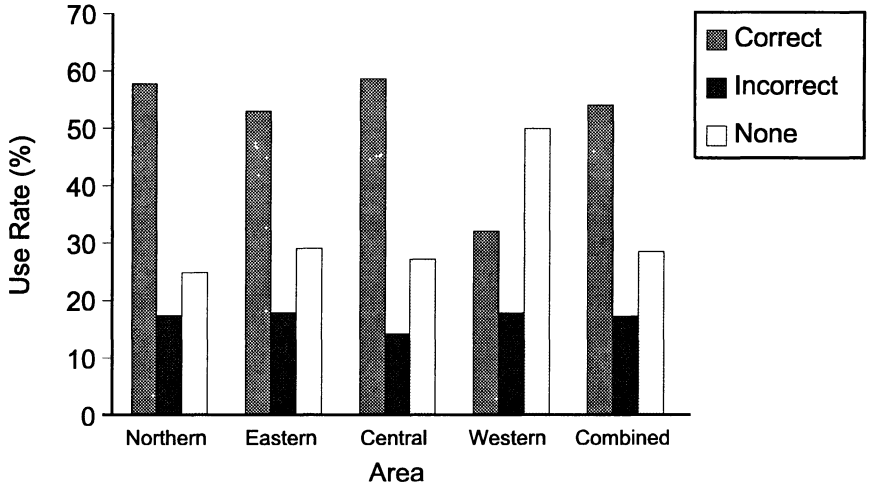

Figure ES-4. 1997 Safety Seat Use in Metropolitan Areas

When the metropolitan child safety seat data were considered across the four surveys, no consistent use trends were found (see Figure ES-5). Correct use was as high as 64.0% (1994) and as low as 48.9% (1993). In the last 2 years, correct use was nearly the same (55.0% and 54.1%). Incorrect use has varied from 8.5% (1996) to 17.5% (1993). Non-use was highest in 1996 (36.5%) and 1993 (33.6%) and lowest in 1994 (25.7%) and 1997 (28.5%). Correct use has declined in each of the metropolitan areas, since either 1993 or 1996, whereas incorrect use has increased.

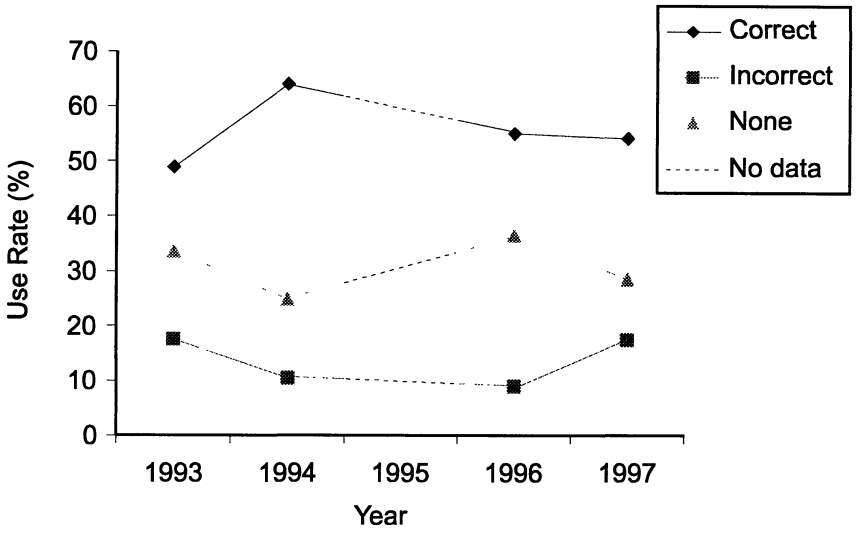

Figure ES-5. Safety Seat Use in Metropolitan Areas for 1993 through 1997

In 1997, child safety seat use rates in mid-size cities were as follows: non-use was 42.0%, incorrect use was 14.8%, and correct use was 43.2%. When the rates for mid-size cities were compared with the rates for the metropolitan areas, correct use was lower and non-use was higher. Danville had the highest non-use rate (61.9%), and Lynchburg and Charlottesville had nearly the same non-use rates (35.5% and 34.5%). As with the metropolitan data, rates of use in these three areas followed the pattern of a higher non-use rate in the front seats (66.7%) than in the rear seats (37.7%).

The data show that compliance with the new law (July 1, 1997) requiring persons 4 to 16 years of age riding in the rear seats to be buckled up was extremely low. The non-compliance rate for the metropolitan areas combined was 62.9%, with area non-compliance rates of 69.3% in Roanoke, 65.6% in Tidewater, 60.7% in Northern Virginia, and 56.6% in Richmond. The non-compliance rates in the mid-size cities were even worse than in the metropolitan rates: 85.7% in Danville, 74.3% in Lynchburg, and 61.3% in Charlottesville.

The researcher recommends that the state institute research to determine why such a large percentage of children are not in child safety seats and why the rate of incorrect use is so high. A cooperative effort between VDH and other Virginia entities and organizations having as their goal the promotion and advocacy of traffic safety improvements (e.g., the Smart, Safe, and Sober Campaign) should be initiated to increase public information and education geared specifically to child safety seat programs and activities. In addition, a special effort needs to be directed at increasing safety restraint use by rear seat occupants 4 to 16 years of age; this effort should include an effective public information and education campaign in conjunction with a specialized enforcement effort. Because the population of persons under age 4 is constantly changing, and because fewer than 60% of the children are protected by a correctly used child safety seat, ongoing and continuous efforts are required.

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INTRODUCTION

With the passage of the Child Safety Seat Law in 1982 (effective date, January 1, 1983) requiring safety seat use by children under age 4, officials of the Department of Motor Vehicles (DMV) requested that data be collected on the use of child safety seats. A child safety seat survey was conducted in March 1983, with additional surveys in June and October 1983. Child safety seat use data have been collected at least annually since then, with the exception of 1995.

Over the years, the number of data collection sites was increased to make the data more representative of statewide use. During the 1983-1986 period, 27 urban sites were surveyed. In 1987, nine sites were added in communities with a population less than 15,000. In 1990, seven sites were added in the urban areas, and in 1991, seven sites were added in cities with a population between 50,000 and 100,000. By 1991, there were 50 sites, and the number of sites in each area was based on the proportion of the state population that lived in the area surveyed. In 1993, when statewide safety belt data collection was initiated in response to Section 153 of the Intermodal Surface Transportation Efficiency Act, child safety seat data were collected only at the 34 metropolitan sites.

In 1993, 1994, and 1996, the DMV's Transportation Safety Administration (now Transportation Safety Services) requested that child safety seat use data be collected using the same procedures, locations, time of day, and day of week each year. A survey was not requested in 1995. In 1997, the program was transferred to the Virginia Department of Health's (VDH) Child Transportation Safety Program. This agency requested that the survey be continued in 1997 and in the same manner as for previous years. In addition, they requested that data on the use of seat belts by occupants 4 to 16 years of age be collected. A new primary enforcement law, requiring that rear seat occupants in this age group be buckled up, was to become effective July 1, 1997 (see Appendix A for a copy of the bill). Data collected in late July and early August would provide a benchmark against which future activities could be evaluated. VDH also requested that data be collected on the use of any booster seats observed. Finally, VDH requested that, if time allowed, data be collected in areas of the state with a population between 50,000 and 100,000; data were collected in three such areas.

The type of data collected changed over the years. From 1983 through 1985, child seat use was recorded as *yes* or *no* with the *no* response including incorrect use. From 1986 to 1997, use was recorded as *correct use, incorrect use,* or *no use.* Data on the gender of the occupant were recorded from 1983 through 1990. Data collection on ethnic group was begun in 1991 and discontinued in 1993.

In-traffic surveys do not allow observers to enter vehicles to check for installation characteristics. Only non-use and misuse obvious from outside the vehicle can be determined. Thus, incorrect use is likely to be underestimated (and correct use overestimated) because the lap/shoulder belt holding the child seat in place cannot be checked for proper tension. Other researchers[1-4] have found that a great proportion of child safety seats are installed with the safety belt at the incorrect tension.

As part of its training program on installing a child safety seat, the Transportation Safety Training Center at Virginia Commonwealth University conducted a number of surveys between 1988 and 1992 at shopping centers and day care centers where trainees entered the automobile to check the child seat. In addition, the Community Traffic Safety Program in DMV District Five (Tidewater) sponsored a number of safety seat checks in the early 1990s in which the automobile was entered. These surveys were not intended to be representative of the general population of the state or of the area in which they were conducted. While acknowledging the biases in the data, both groups found an extremely high rate of misuse, with the most common (modal) rate being 88% and the misuse rate ranging from 75% to 94% (unpublished data). A loose lap/shoulder belt holding the child seat in position was the major reason for the misuse determination. These data probably overestimate the rate of incorrect use among the general population of the state because of the non-random and type-specific manner in which the sites and vehicles were selected and the criteria used in making the incorrect determination, but they indicate a serious installation problem.

Decina and Knoebel[5] also found a number of misuse problems during their 1995 four-state survey of child safety seats. For children under age 4 (the same age used in Virginia), they found that of the nearly 72% in a child safety seat, just over 80% of the seats were misused. The four main misuse/no use factors involved the locking clip, chest (retainer) clip, harness strap, and vehicle safety belt.

In a 1996 study funded by the National Highway Traffic Safety Administration, child restraint use was observed at 2,006 randomly selected sites nationwide.[6] No attempt was made to measure safety seat misuse. In this study, 61.2% of the persons under age 5 and 64.6% of the youth 5 to 15 years of age were restrained. For those under age 5, child safety seat use was considerably lower in the rural areas (35.6%) than in the cities (68.9%).

PURPOSE AND SCOPE

This study had three objectives:

1. Determine child safety seat use rates in the four major metropolitan areas and three mid-size cities in Virginia.

2. Determine restraint use rates by occupants 4 to 16 years of age in the same areas of the state surveyed for child safety seat use.

3. Determine the use rate for booster seats in the same areas.

The 1997 child safety seat survey would be a continuation of a longitudinal study of correct, incorrect, and non-use use rates that began in 1993.

METHODS

For the metropolitan areas, data were collected at signalized intersections at 12 sites in the northern area (Fairfax County, Arlington, and Alexandria), 11 in the eastern area (Norfolk, Virginia Beach, and Newport News), 7 in the central area (Richmond, Henrico, and Chesterfield), and 4 in the western area (Roanoke, Salem, and Vinton). For the mid-size cities, data were collected at two signalized sites in Charlottesville, two in Danville, and three in Lynchburg. The location of these sites is shown in Tables B-1 through B-4, Appendix B. The use of sites at shopping centers and day care centers was considered, but when a sample of these locations was checked at various times of day, either the traffic volume was inadequate or the traffic was not representative of the socioeconomic status of the community at large. Therefore, sites at shopping centers and day care centers were not used.

There were two persons on each survey team. Each was trained in how to collect data, how to identify the factors that constituted correct and incorrect use, and how to estimate whether a child was under age 4. Because this was an in-traffic survey, two indices were used to help determine whether the child was under age 4. The first came from previous versions of the *Code of Virginia* in which required child seat users were defined as weighing 40 lb (18.1 kg) or less. The second was developed as an aid to police officers, where a required child seat user was defined as being 40 in (1.02 m) tall or less. In this survey, if the child was judged to be under 40 in (1.02 m) tall, weigh less than 40 lb (18.1 kg), or both, he or she was assumed to be under age 4. When judging whether an occupant was 4 to 16 years of age, the lower age limit was defined by occupants who were in the child safety seat category, and the upper limit was defined by the apparent age of the driver; the full licensing age in Virginia is 16.

Data were collected for passenger cars, small sport utility vehicles, and small vans in the curb travel lane, and no distinction was made between Virginia-licensed and out-of-state vehicles (the law makes no such distinction). When the vehicles stopped for the red signal, the observers left the curb and approached the vehicle from the passenger side front fender. Each member of the survey team observed up to 15 vehicles per traffic light cycle, with the safety of the observer (staying clear of entrances to businesses) and traffic volume determining the number of vehicles

surveyed. At some intersections, only five vehicles were observed because of the signal timing at the site. As required by state policy, each team member wore a hard hat and an orange safety vest.

Data were collected during four periods each day: 7:30 to 9:00 A.M., 10:30 A.M. to 12:00 NOON, 1:30 to 3:00 P.M., and 4:00 to 5:30 P.M.

In an effort to put occupants at ease, survey personnel carried a clipboard lettered on the back with the message "Child Safety Seat Survey." Upon seeing the message, many drivers lowered their window and responded positively. No negative comments were reported by survey team members; i.e. they were not cursed or threatened, and they did not feel ill at ease over comments.

To distinguish persons in the two age groups, a minus (-) sign was used for those under age 4 and a plus (+) sign was used for those 4 to 16 years of age. Child seat use was recorded as correct (C), incorrect (I), or non-use (N) (see Figure 1). Only those features easily identifiable from outside the vehicle were used to determine whether use was correct or incorrect. These features included that the arm bars/shields were used, 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, that the lap/shoulder belt was routed through the child seat, and that the chest clip was in place. 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 under age 4 in the vehicle and no safety seat was present, a seat was present but was not being used, or a lap belt was being used in place of a safety seat. As previously stated, because of the nature of the survey procedures, correct use was likely to be overestimated, and the number/rate given in the various tables in this report should be considered the maximum level of correct use.

Safety belt use was also recorded as correct, incorrect, and non-use. Non-use was easy to determine. Incorrect use was defined as a shoulder belt obviously loose, behind the back, or under the arm. Correct use was recorded for all remaining occupants who did not fit in the two other classifications.

The procedure for recording booster seat data was different from that used for recording child safety seat and safety restraint use data. If there was a booster seat in the vehicle and it was being used, the data were recorded as correct and incorrect use. Because of the way the data were recorded, there were no non-use data. Booster seat data were collected at the same sites, days, and times as were the child safety seat and safety restraint data.

RESULTS AND DISCUSSION

Tables B-1 through B-4 in Appendix B provide information on the number of occupants observed at each of the 34 metropolitan and 7 mid-size city sites. For occupants under age 4, 484

CHILD SAFETY SEAT SURVEY

Summer 1997

Area _____ Site _____ @ _____ Sheet # _____

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

I = Incorrect C = Correct N = Nonuse S = Safety seat B = Booster seat H = Standard belt system

Figure 1. Survey Form

subjects were observed at the metropolitan sites, and 81 at the mid-size city sites. For occupants 4 to 16 years of age, 1,593 were observed at the metropolitan sites, and 385 at the mid-size city sites. Child safety seat use was recorded for 565 occupants, and safety restraint use was recorded for 1,978 occupants 4 to 16 years of age. Data were also collected on the use of 59 booster seats.

Child Safety Seat Use in Metropolitan Areas

Total Vehicle Use

For the combined metropolitan areas in 1977, correct use was 54.1%, incorrect use was 17.4%, and non-use was 28.5% (see Figure 2 and Table C-1). The term *correct use* signifies the maximum level possible, because as previously discussed, in in-traffic surveys there are certain limitations with regard to determining loose belt systems holding a child safety seat in place.

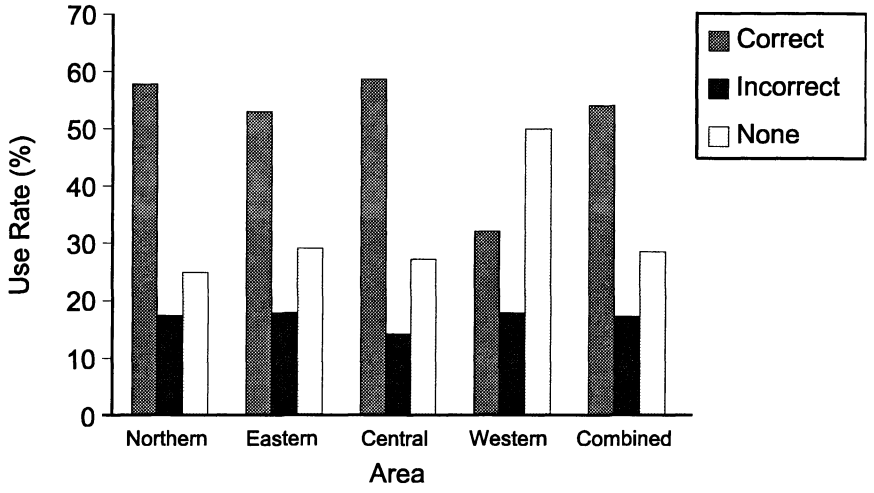

Figure 2. Total Vehicle Safety Seat Use in Metropolitan Areas in 1997

Correct use was similar in three areas: 53.1% (eastern), 57.0% (northern), and 58.7% (central); only in the western area was correct use, at 32.1%, much lower. Incorrect use varied by less than 1 point in the northern, eastern, and western areas, from 17.8% to 18.5%, with a rate of 14.1% in the central area. Non-use also was similar in three areas: 24.5% (northern), 27.2% (central), and 29.1% (eastern). In the western area, the rate was 50.0%. The western area was the outlier area, with the lowest correct use and the highest non-use rates.

The 1997 rates were also compared with those from previous years. No single trend was observed (see Tables C-1, C-6, C-7, and C-8). For the combined metropolitan areas, correct use in 1997 was nearly the same as in 1996 (54.1% vs. 55.0%), incorrect use was higher (17.4% vs. 8.5%), and non-use was lower (28.5% vs. 36.5%). Since 1993, correct use has increased 5.2 points, incorrect use has remained the same, and non-use has decreased 5.1 points (see Figure 3).

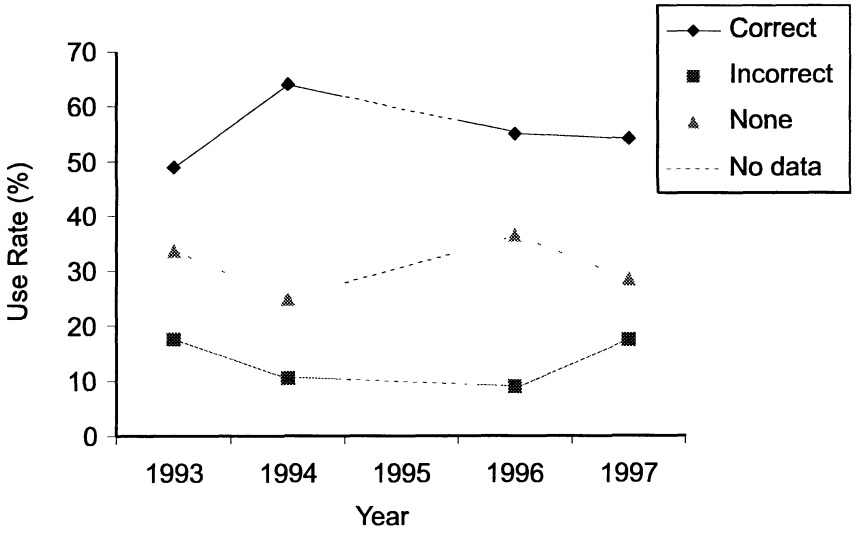

Figure 3. Metropolitan Area Safety Seat Use by All Vehicle Occupants for 1993 through 1997

Rates varied considerably among areas and years, with no single longitudinal trend applicable to all areas over time (see Tables C-1, C-6, C-7, and C-8). In the northern area, correct use was 4 points lower in 1997 than in 1996, incorrect use was more than 12 points higher, and non-use was more than 8 points lower. Since 1993, the 1997 correct use was up, incorrect use was down, and non-use was down by nearly 12 points. Overall, use in the northern area in 1997 was improved over that in 1993 and 1996. In the eastern area, correct use was nearly the same in 1997 and 1996, incorrect use was 6.3 points higher in 1997, and non-use was 7.2 points lower in 1997. Since 1993, the 1997 correct use was 4.4 points lower, incorrect use was nearly 8 points higher, and non-use was just over 3 points lower. Overall, eastern area use improved slightly between 1996 and 1997, but the 1997 rates were worse than those for 1993. In the central area, correct use was up 11.3 points between 1996 and 1997, incorrect use was up 4.3 points, and non-use was down 15.7 points. Since 1993, correct use was up more than 11 points, incorrect use was nearly the same, and non-use was down by more than 11 points. Overall, use in the central area in 1997 was much improved. In the western area, correct use was down nearly 21 points between 1996 and 1997, incorrect use was up 12.3 points, and non-use was up 8.3 points. Since 1993, correct use was down 12.3 points, incorrect use was down 15.4 points, and non-use was up nearly 28 points. Overall, rates in the western area were much worse in 1997 than in all previous years.

Two findings stand out. The first is the large percentage of occupants under age 4 who were not in a child safety seat. The second (and a corollary to the first) was the low rate of correct use of child safety seats throughout the state.

Front Seat Use

For the combined metropolitan areas in 1977, correct use was 37.9%, incorrect use was 20.0%, and non-use was 42.1% (see Figure 4 and Table C-1). Usage varied considerably among areas. None of the 8 subjects in the western area was in a correctly used child safety seat. Correct use rates in the other three areas were 38.5% (northern), 41.0% (eastern), and 45.5% (central).

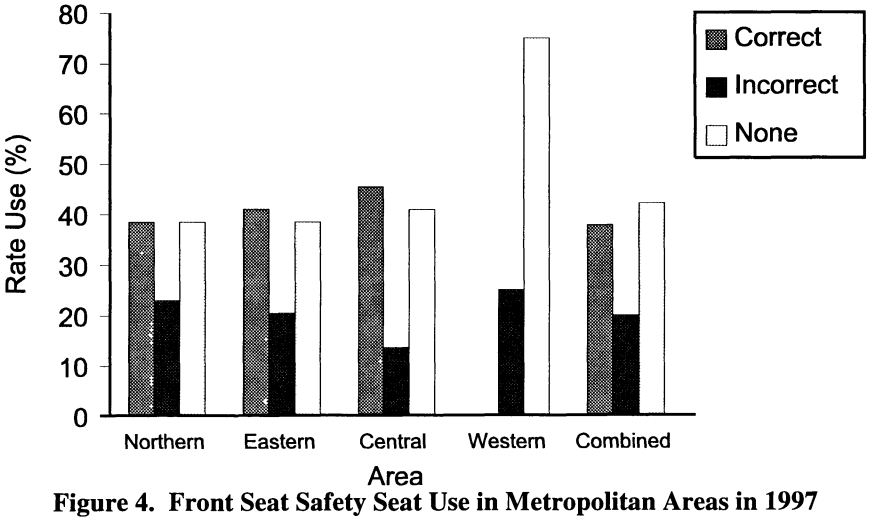

Figure 4. Front Seat Safety Seat Use in Metropolitan Areas in 1997

Incorrect use in the northern, eastern, and western areas ranged from 20.5% (eastern) to 25.0% (western). Incorrect use was lowest in the central area at 13.6%. Non-use was 38.5% in the northern and eastern areas, 40.9% in the central area, and 75.0% (6 of 8) in the western area.

The 1997 data were compared with those from previous years (see Tables C-1, C-6, C-7, and C-8 and Figure 5). Correct use declined, from 49.3% in 1994 to 37.9% in 1997, and the 1997 rate was even lower than in 1993 (40.8%). Incorrect use declined from 16.8% in 1993 to 10.5% in 1996 before nearly doubling to 20.0% in 1997. Non-use remained relatively stable, with the low rate in 1994 (38.0%) and the high rate in 1996 (45.1%). Non-use in 1997 was nearly the same as in 1993 (42.1% vs. 42.4%).

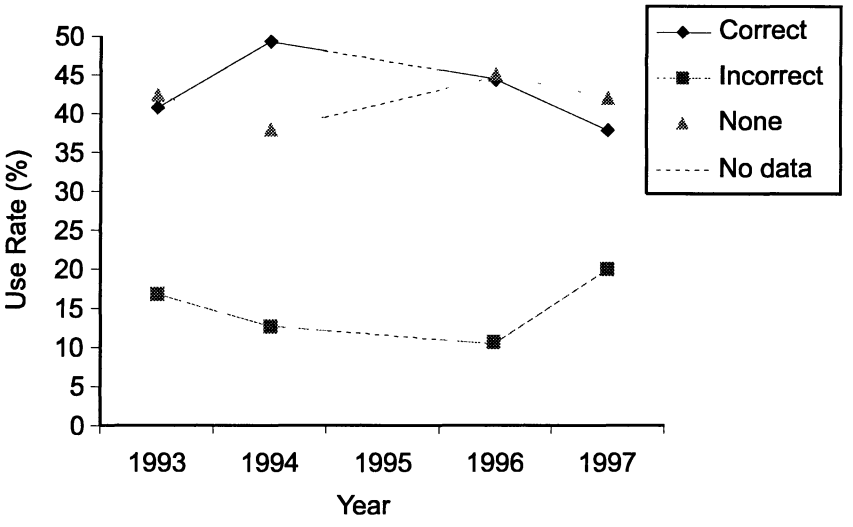

Figure 5. Metropolitan Area Safety Seat Use by Front Seat Occupants for 1993 through 1997

No trend among areas could be identified. Between 1996 and 1997, the change in use in the northern area consisted of an 11.5-point drop in correct use, a 17.1-point rise in incorrect use, and a 5.5-point decline in non-use. Since 1993, correct use in the northern area increased by nearly 11 points, incorrect use decreased by 4.5 points, and non-use decreased by 6.3 points. Overall, 1997 use was better than in 1993 but not as good as in 1996. In the eastern area, correct use was down 3.6 points between 1996 and 1997, incorrect use was up 6.2 points, and non-use was down 2.6 points. Since 1993, correct use in 1997 was down 5.0 points, incorrect use was up 4.5 points, and non-use was nearly the same (38.5% vs. 38.0%). Overall, the 1997 eastern area rates were not as good as in previous years. In the central area, correct use was up 10.4 points between 1996 and 1997, incorrect use was the same, and non-use was down 10.5 points. Since 1993, correct use declined 9.7 points in the central area, incorrect use rose 6.7 points, and non-use rose 3 points. Overall, there was both good and bad news for the central area: 1997 rates were better than in 1996 but worse than in 1993. In the western area, in 1997, correct use was 0%, incorrect use was up nearly 20 points over 1996, and non-use was up nearly 28 points. Since 1993, correct, incorrect, and non-use rates were worse in 1997. Overall, the 1997 rates were much worse than those in all previous years.

Three findings stand out. First, rates of correct use have declined in all areas of the state, either since 1996 or since 1993, showing that we are going in the wrong direction. Second, a very large percentage of occupants under age 4 in the metropolitan areas were not in a child safety seat. Third, incorrect use was higher in 1997 than in previous years.

Rear Seat Use

For the metropolitan areas combined in 1997, correct use was 58.1%, incorrect use was 16.7%, and non-use was 25.2% (see Figure 6 and Table C-1). Correct use rates were 45.0% (western), 55.7% (eastern), 60.8% (northern), and 62.9% (central) for the four areas. Incorrect use was greatest in the northern (17.6%) and eastern (17.2%) areas and lowest in the central (14.3%) and western (15.0%) areas. Non-use was 21.6% (northern), 22.9% (central), 27.0% (eastern), and 40.0% (western) in the four areas. Overall, in 1997, the central area had the best rate, and the western area had the worst.

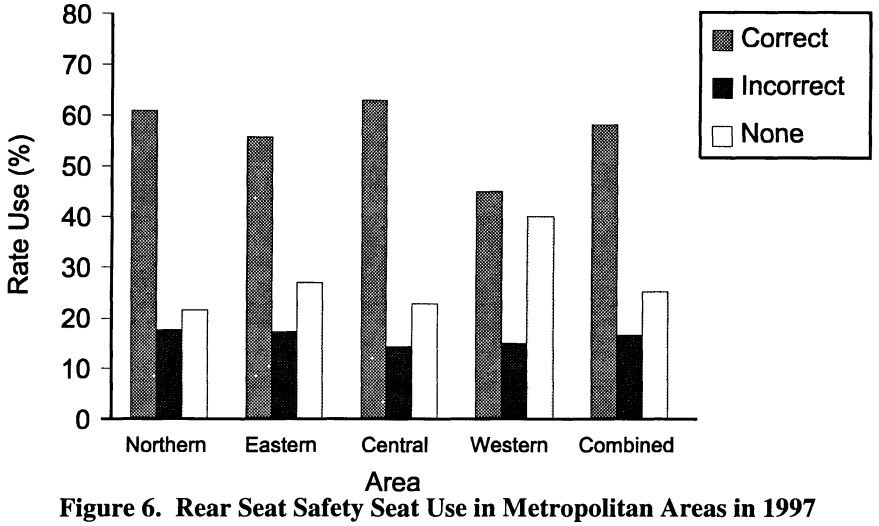

Figure 6. Rear Seat Safety Seat Use in Metropolitan Areas in 1997

The 1997 rates were compared with those from the three previous surveys (see Tables C-1, C-6, C-7, and C-8 and Figure 7). In 1997, correct use was nearly the same (58.1% and 57.7%), incorrect use was more than double (16.7% vs. 8.0%), and non-use was 9 points lower than in 1966. In comparison with 1993, the 1997 combined metropolitan area correct use rate was 6.5 points higher (58.1% vs. 51.6%), incorrect use was 1 point lower, and non-use was 5.5 points lower (30.7% vs. 25.2%). For the metropolitan areas combined, use in 1997 was improved over that in 1993 and 1996.

The use rates differed by area. In the northern area, 1997 correct use was 2.5 points lower than in 1996, incorrect use was nearly 11.5 points higher, and non-use was 9 points lower. Since 1993, correct use was 15.8 points higher, incorrect use was 3 points lower, and non-use was 12.8 points lower. In the northern area, correct use was much better in 1997 than in 1993 and slightly better than in 1996. In the eastern area, correct use changed little between 1996 and 1997 (54.2% vs. 55.7%), incorrect use was 6.5 points higher in 1997 and non-use was 8 points lower. Since

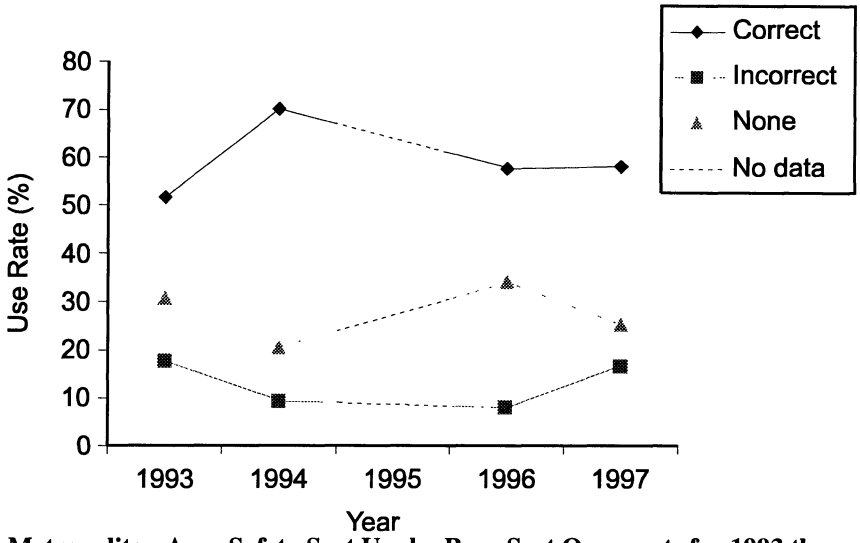

Figure 7. Metropolitan Area Safety Seat Use by Rear Seat Occupants for 1993 through 1997

1993, correct use declined by 6.3 points, incorrect use increased by 9 points, and non-use decreased by 3.2 points. In 1997, eastern area use was better than in 1996 but worse than in 1993. Central area correct use was more than 10 points higher in 1997 than in 1996, incorrect use was 6 points higher, and non-use was 16.7 points lower. Since 1993, the 1997 central area correct use, incorrect use, and non-use were much improved. The central area was the only area where the 1997 results were noticeably better than in the three previous surveys. In the western area, 1997 correct use was 9.7 points lower, incorrect use was 9.3 points higher than in 1996, and non-use was nearly the same both years. Since 1993, correct use in 1997 dropped 7.2 points, incorrect use dropped by more than 24 points, and non-use increased by 31.3 points. The western area was the only area where the 1997 results were worse than those in 1996 and 1993.

Six findings are apparent. First, the combined metropolitan area non-use rate exceeded 25% in three of the four surveys. Second, the non-use rate was lower (better) for the rear seats than for the front seats. Third, non-use has been a continuing major problem in the metropolitan areas of the state. Fourth, the correct use rate was relatively low (below 60%) in the metropolitan areas for all 4 years. Fifth, the incorrect use rate was much worse in 1997 than in 1996. Sixth, in 1997, the western area had the worst use rates, and the central area had the best.

Child Safety Seat Use in Mid-Size Cities

Total Vehicle Use

For the combined localities, correct use was 43.2%, incorrect use was 14.8%, and non-use was 42.0% (see Table C-2 and Figure 8). Non-use was greatest in Danville (61.9%) and nearly the same in Lynchburg (35.5%) and Charlottesville (34.5%). Incorrect use was 13.8% in Charlottesville, 14.3% in Danville, and 16.1% in Lynchburg. Correct use was highest in Charlottesville (51.7%), then Lynchburg (48.4%), and Danville had a correct use rate of only 23.8%.

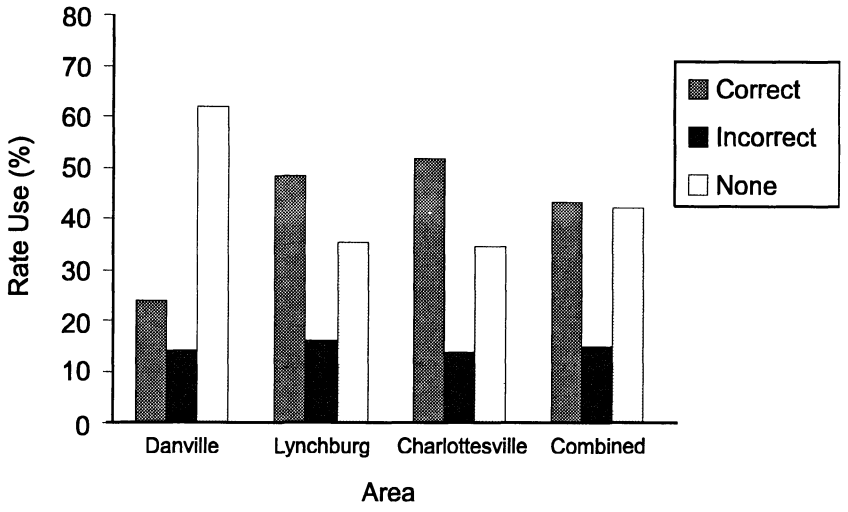

Figure 8. Total Vehicle Safety Seat Use in Mid-Size Cities in 1997

Front Seat Use

Only 12 occupants under age 4 were observed riding in the front seats. Of these, 8 (66.7%) were not using a child safety seat and 4 (33.3%) were correctly buckled up (see Table C-2). Because of the small numbers, comparisons between localities are not useful. What was apparent, however, was that non-use was the prevailing pattern. Although the actual number of non-users was small, this finding of a high *rate* of non-use is critical in light of deaths of and injuries to children caused by the passenger side air bag deploying in low-speed crashes.[7,8]

Rear Seat Use

There were 69 occupants under age 4 in the rear seats. The correct use rate for the localities combined was 44.9%, incorrect use was 17.4%, and non-use was 37.7% (see Table C-2). Charlottesville had the highest correct use (53.8%), followed by Lynchburg (46.2%), then Danville (29.4%). Incorrect use was 19.2% in Lynchburg, 17.6% in Danville, and 15.4% in Charlottesville. Non-use was 52.9% in Danville, 34.6% in Lynchburg, and 30.8% in Charlottesville. Even in Charlottesville, the area with the highest correct and lowest incorrect and non-use rates, the use rate of child safety seats was very low and was lower than in three of the four metropolitan areas (the western metropolitan area had rates comparable to the combined mid-size city rates).

Child Safety Seat Use for All Sites Combined

Although combining the data from the 34 metropolitan sites (484 occupants) and the 7 mid-size city sites (81 occupants) does not produce a statewide rate, it does indicate an overall child safety seat use in selected areas of Virginia. For the total vehicle, correct use was 52.6%,

incorrect use was 17.0%, and non-use was 30.4%. These rates are more closely aligned with those from the metropolitan areas (54.1%, 17.4%, and 28.5%) than from the mid-size cites (43.2%, 14.8%, and 42.0%), but this is understandable because 86% of the observations were in the metropolitan areas.

In the front seats, combined correct use was 37.4%, incorrect use was 17.8%, and non-use was 44.9%. In the rear seats, combined correct use was 56.1%, incorrect use was 16.8%, and non-use was 27.1%. There was little difference in incorrect use rates for the front and rear seat positions. The combined correct use rate was one-third greater in the rear seats, whereas non-use was two-thirds less in the rear seats.

Safety Restraint Use by Occupants 4 to 16 Years of Age in Metropolitan Areas

Total Vehicle Use

For the metropolitan areas combined, correct use was 44.7%, incorrect use was 4.5%, and non-use was 50.8% (see Table C-3). Correct use was 47.8% for the central area, 47.1% for the northern area, 44.2% for the eastern area, and a much lower 32.9% for the western area. Incorrect use was lowest (best) in the eastern (3.6%) and central (3.7%) areas and highest in the western (5.6%) and northern (5.9%) areas. Non-use was 47.1% in the northern area, 48.5% in the central area, and 52.2% in the eastern area, all rates within a relatively narrow range, but in the western area, 61.5% were non-users.

Thus, the prevailing pattern of safety restraint use was either non-use or correct use (incorrect use was moderately low in all four areas), with non-use being at a higher rate than correct use.

Front Seat Use

For the metropolitan areas combined, correct use was 55.5%, incorrect use was 6.8%, and non-use was 37.7% (see Table C-3). Correct use in the western area was 44.1%. In the other three areas, correct use was 53.1% (central), 56.0% (eastern), and 59.9% (northern). Incorrect use was 2.9% in the western area, 6.3% in the eastern, 6.9% in the central area, and 9.0% in the northern area. Non-use was highest (52.9%) in the western area, with rates of 40.0% (central), 37.8% (eastern), and 31.1% (northern) in the other three areas.

Thus, even with a statute requiring that these young occupants be in a safety restraint system, between 31.0% and 53.0% in the front seats were in violation of the law. Further, in each of the four metropolitan areas, the belt use rates for front seat occupants 4 to 16 years of age are lower than for all front seat occupants statewide (the 1997 statewide safety belt use rate was 67.1%).

Rear Seat Use

For the metropolitan areas combined, correct use was 34.9%, incorrect use was 2.3%, and non-use was 62.9% (see Table C-3), rates that might be considered abysmal. Correct use was 42.8% in the central area, 36.0% in the northern area, 33.2% in the eastern area, and only 22.7% in the western area (see Figure 9). Incorrect use was 8.0% (western), 3.2% (northern), 1.1% (eastern), and 0.7% (central) in the four areas. Non-use was 56.6% (central), 60.7% (northern), 65.6% (eastern), and 69.3% (western) in the four areas. Correct use was much lower and non-use was much higher in the rear seats than in the front seats. When compared to the statewide front seat use rate of 67.1%, use by occupants 4 to16 years of age in the rear seats was much lower. These data show that the state has much work to accomplish in getting the message out and having children buckled up.

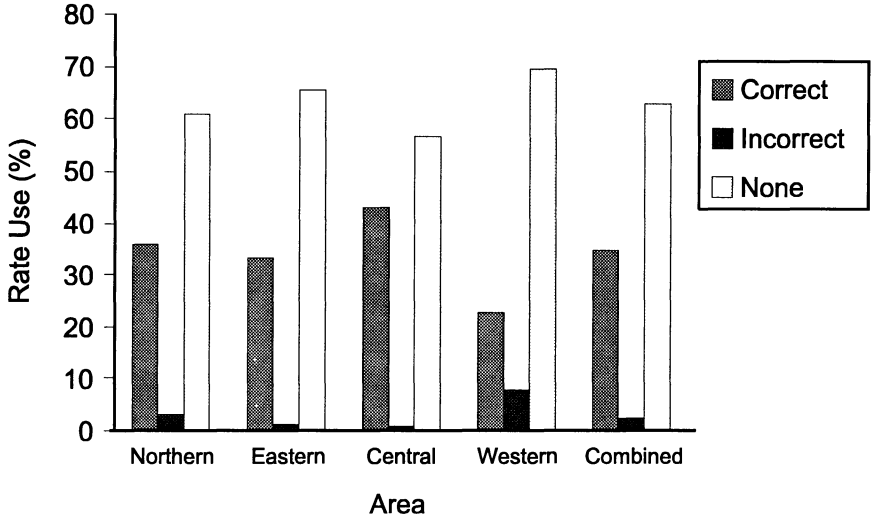

Figure 9. Safety Restraint Use by Rear Seat Occupants 4 to 16 Years of Age in Metropolitan Areas in 1997

Safety Restraint Use by Occupants 4 to 16 Years of Age in Mid-Size Cities

Total Vehicle Use

When the data from Charlottesville, Lynchburg, and Danville were combined, correct use was 31.9%, incorrect use was 3.4%, and non-use was 64.7% (see Table C-4). Correct use ranged from 42.8% (Charlottesville) to only 14.3% (Danville). Incorrect use was 5.3% (Charlottesville), 3.0% (Lynchburg), and 1.0% (Danville). Non-use was 52.0% in Charlottesville, 64.4% in Lynchburg, and 84.7% in Danville. These data show that occupants 4 to 16 years of age are not safety restraint users in the three mid-size cities surveyed.

Front Seat Use

When the data from the three localities were combined, correct use was 38.5%, incorrect use was 5.6%, and non-use was 55.9% (see Table C-4). Correct use was 51.4% in Charlottesville, 40.0% in Lynchburg, and 14.3% in Danville. Incorrect use was 6.9% in Charlottesville, 6.2% in Lynchburg, and 2.4% in Danville. Non-use in Danville, at 83.3%, was double that of Charlottesville (41.7%); Lynchburg had a non-use rate of 53.8%. These data show that the old belt use laws were not very effective in getting these young persons into safety restraints.

Rear Seat Use

The survey of mid-size cities began in the second week of August 1997, approximately 6 weeks after the effective date of changes to §§ 46.2-1094 and 46.2-1095 of the *Code of Virginia*, requiring safety restraint use by rear seat occupants 4 to 16 years of age. Correct use for the localities combined was 26.2%, incorrect use was 1.5%, and non-use was 72.3% (see Table C-4). Correct use was 35.0% in Charlottesville, 25.7% in Lynchburg, and 14.3% in Danville (see Figure 10). In both Danville and Lynchburg, incorrect use was 0 and was only 3.8% in Charlottesville. Non-use was 61.3% in Charlottesville, 74.3% in Lynchburg, and 85.7% in Danville. Rear seat occupants used safety restraints less than front seat occupants. This could be the result of a lack of knowledge of the new law as it was in effect only since July 1, 1997, but this would not explain the high rate of non-use by front seat occupants. When more than 7 of 10 rear seat occupants 4 to 16 years of age are not using safety restraint systems, the problem is serious and needs to be addressed.

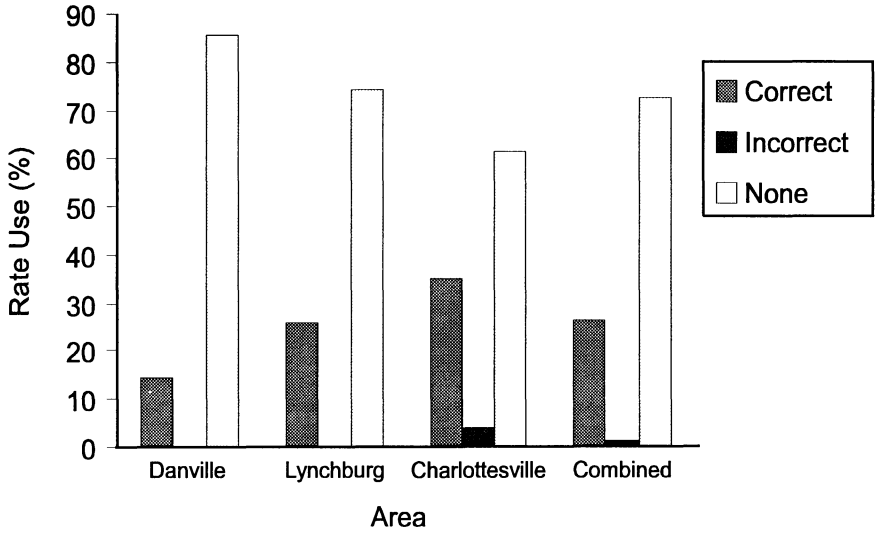

Figure 10. Safety Restraint Use by Rear Seat Occupants 4 to 16 Years of Age in Mid-Size Cities in 1997

Safety Restraint Use by Occupants 4 to 16 Years of Age for All Sites Combined

The data from the 34 metropolitan sites (1,593 occupants) and the 7 mid-size city sites (385 occupants) were combined. For the total vehicle, correct use was 42.2%, incorrect use was 4.2%, and non-use was 53.5%. These rates are more similar to those for the metropolitan areas (44.7%, 4.5%, and 50.8%) than for the mid-size cities (31.9%, 3.4%, and 64.7%). This is understandable in light of the fact that nearly 81% of the observations were from the metropolitan areas.

In the front seats, the combined correct use rates for occupants 4 to 16 years of age was 52.2%, incorrect use was 6.6%, and non-use was 41.2%. In the rear seats, correct use was 33.1%, incorrect use was 2.1%, and non-use was 64.7%. Correct use in the rear seats was nearly 58% lower than in the front seats, and non-use was just over 36% greater in the rear seats. These data suggest that that the new primary enforcement statute requiring safety belt use by young persons did not have an immediate and dramatic effect.

Booster Seat Use

In 61.5 hours of data collection, only 59 occupants were observed using booster seats, 47 in the metropolitan areas and 12 in the mid-size cities (see Table C-5). There were 9 front seat occupants and 50 rear seat occupants. In light of the small data set, the booster seat data were considered only by seat position. The correct use rate was 77.8% in the front seats, 84.0% in the rear seats, and 83.1% for the entire vehicle. These data show that when booster seats were being used, a high percentage was being used correctly (as determined from outside the vehicle stopped at a signal).

MAJOR FINDINGS FOR 1997

Child Safety Seats

- For the metropolitan areas combined, correct use was 54.1%, non-use was 17.4%, and incorrect use was 28.5%.

- In the metropolitan areas, correct use was lowest (32.1%) and non-use highest (50.0%) in the western area.

- In the metropolitan areas, correct use was higher in the rear seats (58.1%) than in the front seats (37.9%), and non-use was higher in the front seats (42.1%) than in the rear seats (25.2%).

- Correct use was higher in the metropolitan areas (54.1%) than in the mid-size cities (43.2%), and non-use was higher in the mid-size cities (42.0%) than in the metropolitan areas (28.5%).

Restraint Use by Occupants 4 to 16 Years of Age

- For the metropolitan areas combined, non-use was 50.8%.
- Non-use was higher in the mid-size cities (64.7%) than in the metropolitan areas (50.8%).
- Non-use was higher in the rear seats than in the front seats in both the metropolitan areas (62.9% vs. 37.7%) and mid-size cities (72.3% vs. 55.9%).

Booster Seats

- Of the booster seats used, 83.1% were used correctly.

CONCLUSIONS

- Since the child safety seat statute applies only to persons under age 4, nearly 25% of the infants in the observation group are different each year. The relatively high rates of non-use and incorrect use of child safety seats are affected by changes in the survey population.
- The extremely low rate of safety restraint use by rear seat occupants 4 to 16 years of age could have resulted because, at the time of data collection, the law had been in effect for only 6 to 7 weeks. The rate of use was highest in the central (Richmond) metropolitan area, where news coverage of the legislative debates regarding the new law and billboards informing the public of the change in the law, may have influenced public awareness.
- Two very different problems as to safety restraint use become evident when the data are categorized by seat position: (1) child safety seat correct use was lower in the front seats than in the rear seats, and (2) belt use by occupants 4 to 16 years of age was lower in the rear seats than in the front. Each problem requires a different strategy to resolve.

RECOMMENDATIONS

- Virginia should initiate research to identify why such a large percentage of motor vehicle occupants under 16 years of age are not using an appropriate safety restraint system.
- A cooperative effort between the VDH and other Virginia entities and organizations having as their goal the promotion and advocacy of traffic safety improvements (e.g., the Commonwealth's Smart, Safe, and Sober Campaign) should be initiated to implement a comprehensive statewide educational program emphasizing the unacceptably high rate of non-use of child safety seats and safety belts, especially among front seat occupants, and the

consequences of not having a child appropriately protected by a safety restraint system when a crash occurs.

- In conjunction with the educational program, a special enforcement effort should be directed at increasing safety restraint use by rear seat occupants 4 to 16 years of age.

- Local education and enforcement efforts should be continuous and ongoing. Each year, a new group of infants enters traffic, and efforts to educate parents should be a high priority among safety officials.

ACKNOWLEDGMENTS

The author thanks Amanda Lanham and Bryan Prillaman, 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. Bryan also prepared the various tables and figures used in this report.

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APPENDIX A

Bill Amending Sections 46.2-1094 and 46-2-1095 of the *Code of Virginia* to Require Rear Seat Occupants from 4 to 16 Years of Age to Use Safety Belts

CHAPTER 793

An Act to amend and reenact §§ 46.2-1094 and 46.2-1095 of the Code of Virginia, relating to seat belts for children between the ages of four and sixteen; penalty.

[S 971]

Approved April 2, 1997

Be it enacted by the General Assembly of Virginia:

1. That §§46.2-1094 and 46.2-1095 of the Code of Virginia are amended and reenacted as follows:

§46.2-1094. Occupants of front seats of motor vehicles required to use safety lap belts and shoulder harnesses; penalty.

A. Each person at least sixteen years of age and occupying the front seat of a motor vehicle equipped or required by the provisions of this title to be equipped with a safety belt system, consisting of lap belts, shoulder harnesses, combinations thereof or similar devices, shall wear the appropriate safety belt system at all times while the motor vehicle is in motion on any public highway. A child under the age of ~~four~~ *sixteen* years, however, shall be protected as required by the provisions of this chapter.

~~B. Each driver of a motor vehicle equipped or required by the provisions of this title to be equipped with a safety belt system who is transporting a child at least four years of age, but less than sixteen years of age, in the front seat of such motor vehicle shall cause such child to wear the appropriate safety belt system.~~

~~C.~~ *B.* This section shall not apply to:

1. Any person for whom a licensed physician determines that the use of such safety belt system would be impractical by reason of such person's physical condition or other medical reason, provided the person so exempted carries on his person or in the vehicle a signed written statement of the physician identifying the exempted person and stating the grounds for the exemption; or

2. Any law-enforcement officer transporting persons in custody or traveling in circumstances which render the wearing of such safety belt system impractical; or

3. Any person while driving a motor vehicle and performing the duties of a rural mail carrier for the United States Postal Service; or

4. Any person driving a motor vehicle and performing the duties of a rural newspaper route carrier, newspaper bundle hauler or newspaper rack carrier; or

5. Drivers of taxicabs; or

6. Personnel of commercial or municipal vehicles while actually engaged in the collection or delivery of goods or services, including but not limited to solid waste, where such collection or delivery requires the personnel to exit and enter the cab of the vehicle with such frequency and regularity so as to render the use of safety belt systems impractical and the safety benefits derived therefrom insignificant. Such personnel shall resume the use of safety belt systems when actual collection or delivery has ceased or when the vehicle is in transit to or from a point of final disposition or disposal, including but not limited to solid waste facilities, terminals, or other location where the vehicle may be principally garaged; or

7. Any person driving a motor vehicle and performing the duties of a utility meter reader; or

8. Law-enforcement agency personnel driving motor vehicles to enforce laws governing motor vehicle parking.

~~D.~~ *C.* Any person who violates this section shall be subject to a civil penalty of twenty-five dollars to be paid into the state treasury and credited to the Literary Fund. No assignment of demerit points shall be made under Article 19 of Chapter 3 (§46.2-489 et seq.) of this title and no court costs shall be assessed for violations of this section.

~~E.~~ *D.* A violation of this section shall not constitute negligence, be considered in mitigation of damages of whatever nature, be admissible in evidence or be the subject of comment by counsel in any action for the recovery of damages arising out of the operation, ownership, or maintenance of a motor vehicle, nor shall anything in this section change any existing law, rule, or procedure pertaining to any such civil action.

~~F.~~ *E.* A violation of this section may be charged on the uniform traffic summons form.

~~G.~~ *F.* No citation for a violation of this section shall be issued unless the officer issuing such citation has cause to stop or arrest the driver of such motor vehicle for the violation of some other provision of this Code or local ordinance relating to the operation, ownership, or maintenance of a motor vehicle or any criminal statute.

~~H.~~ *G.* The governing body of any city having a population of at least 66,000 but no more than 67,000 may adopt an ordinance not inconsistent with the provisions of this section, requiring the use of safety belt systems. The penalty for violating any such ordinance shall not exceed a fine or civil penalty of twenty-five dollars.

§46.2-1095. Child restraint devices required; safety belts for children four to sixteen required; penalty.

A. Any person who drives on the highways of Virginia any motor vehicle manufactured after January 1, 1968, shall ensure that any child under the age of four ~~(i) of which he is the parent or legal guardian or (ii) which~~ *whom* he ~~regularly~~ transports therein is provided with and properly secured in a child restraint device of a type which meets the standards adopted by the United States Department of Transportation.

B. Any person transporting any child at least four years of age, but less than sixteen years of age, shall ensure that such child is provided with and properly secured by an appropriate safety belt system when driving on the highways of Virginia in any motor vehicle manufactured after January 1, 1968, equipped or required by the provisions of this title to be equipped with a safety belt system, consisting of lap belts, shoulder harnesses, combinations thereof or similar devices.

C. A violation of this section shall not constitute negligence, be considered in mitigation of damages of whatever nature, be admissible in evidence or be the subject of comment by counsel in any action for the recovery of damages in a civil action.

D. Any person who violates subsection B of this section shall be subject to a civil penalty of twenty-five dollars to be paid into the state treasury and credited to the Child Restraint Device Special Fund pursuant to §46.2-1097. No assignment of demerit points shall be made under Article 19 (§46.2-489 et seq.) of Chapter 3 of this title and no court costs shall be assessed for violations of this section.

E. A violation of this section may be charged on the uniform traffic summons form.

F. Nothing in this section shall apply to taxicabs, school buses, executive sedans, limousines, or the rear cargo area of pickup trucks or other vehicles.

Go to (General Assembly Home)

APPENDIX B

Safety Restraint Use by Site Location and Seat Position

Table B-1
1997 Child Safety Seat Survey Results for Metropolitan Areas

Site Location	Front Seat			Rear Seat			Total Vehicle		
	C*	I	N	C	I	N	C	I	N
Northern Area									
1 Rolling Road	0	1	1	11	2	4	11	3	5
2 Route 7	0	0	0	7	3	6	7	3	6
3 S. George Mason	2	0	2	7	1	2	9	1	4
4 N. Glebe	0	1	3	3	1	0	3	2	3
5 Rose Hill	0	0	0	1	1	2	1	1	2
6 Jordan	0	0	0	3	0	1	3	0	1
7 Route 1	3	0	0	6	0	5	9	0	5
8 Woodbridge	1	0	1	2	0	1	3	0	2
9 Herndon	1	2	2	8	2	3	9	4	5
10 Vienna	3	1	1	17	6	0	20	7	1
11 Fairfax City	0	1	0	8	5	1	8	6	1
12 Annandale	0	0	0	3	1	2	3	1	2
Northern Area Total	10	6	10	76	22	27	86	28	37
Western Area									
1 Hershberger	0	0	0	2	1	0	2	1	0
2 Orange	0	0	2	1	1	1	1	1	3
3 Vinton	0	0	1	3	0	2	3	0	3
4 Salem	0	2	3	3	1	5	3	3	8
Western Area Total	0	2	6	9	3	8	9	5	14
Central Area									
1 Broad Street	0	0	0	1	0	3	1	0	3
2 Hull Street	0	0	3	6	2	4	6	2	7
3 Chester	3	1	0	9	2	2	12	3	2
4 Petersburg	1	1	3	1	0	5	2	1	8
5 Midlothian	3	0	0	5	2	0	8	2	0
6 Parham Rd.	2	1	2	18	3	0	20	4	2
7 9-Mile Rd.	1	0	1	4	1	2	5	1	3
Central Area Total	10	3	9	44	10	16	54	13	25
Eastern Area									
1 Independence	0	0	0	3	0	1	3	0	1
2 Kempsville	1	1	5	14	5	3	15	6	8
3 Chesapeake	1	1	2	11	6	6	12	7	8
4 Portsmouth	1	0	1	2	1	1	3	1	2
5 Route 170	1	0	2	3	1	2	4	1	4
6 Laskin	1	1	1	17	2	7	18	3	8
7 Brambleton	1	0	1	7	2	6	8	2	7
8 Military Circle	5	0	0	11	5	6	16	5	6
9 Denbigh	2	1	2	14	3	7	16	4	9
10 Hampton	1	1	1	5	4	5	6	5	6
11 Route 143	2	3	0	10	1	3	12	4	3
Eastern Area Total	16	8	15	97	30	47	113	38	62
Urban Total	36	19	40	226	65	98	262	84	138
Grand Total									484

*C = correct use; I = incorrect use, N = none.

Table B-2
1997 Child Safety Seat Survey Results for Mid-Size Cities

Site Location	Front Seat			Rear Seat			Total Vehicle		
	C*	I	N	C	I	N	C	I	N
Charlottesville									
1 High	1	0	1	3	2	4	4	2	5
2 Emmet	0	0	1	11	2	4	11	2	5
Charlottesville Total	1	0	2	14	4	8	15	4	10
Danville									
1 Main	0	0	3	0	1	5	0	1	8
2 Piney Forest	0	0	1	5	2	4	5	2	5
Danville Total	0	0	4	5	3	9	5	3	13
Lynchburg									
1 Chandler Mtn	1	0	0	5	0	3	6	0	3
2 Oakley	1	0	1	3	4	3	4	4	4
3 Old Forest	1	0	1	4	1	3	5	1	4
Lynchburg Total	3	0	2	12	5	9	15	5	11
Urban Total	4	0	8	31	12	26	35	12	34
Grand Total									81

*C = correct use; I = incorrect use, N = none.

Table B-3
1997 Survey Results of Safety Restraint Use by Occupants 4 to 16 Years of Age in the Metropolitan Areas

Site Location	Front Seat			Rear Seat			Total Vehicle		
	C*	I	N	C	I	N	C	I	N
Northern Area									
1 Rolling Road	17	3	12	18	1	28	35	4	40
2 Route 7	14	1	1	11	2	17	25	3	18
3 S. George Mason	12	2	7	5	2	13	17	4	20
4 N. Glebe	3	1	5	3	0	9	6	1	14
5 Rose Hill	12	1	4	4	0	1	16	1	5
6 Jordan	7	2	3	5	0	7	12	2	10
7 Route 1	13	0	3	7	2	20	20	2	23
8 Woodbridge	4	0	2	4	0	1	8	0	3
9 Herndon	10	0	5	7	1	15	17	1	20
10 Vienna	14	6	11	8	0	15	22	6	26
11 Fairfax City	12	2	8	12	0	12	24	2	20
12 Annandale	9	1	5	5	0	12	14	1	17
Northern Area Total	127	19	66	89	8	150	216	27	216
Western Area									
1 Hershberger	4	0	9	2	0	3	6	0	12
2 Orange	2	1	4	9	4	8	11	5	12
3 Vinton	6	0	8	4	1	18	10	1	26
4 Salem	18	1	15	2	1	23	20	2	38
Western Area Total	30	2	36	17	6	52	47	8	88
Central Area									
1 Broad Street	5	1	6	3	0	8	8	1	14
2 Hull Street	5	2	11	12	0	15	17	2	26
3 Chester	24	3	7	13	0	19	37	3	26
4 Petersburg	7	1	11	10	0	17	17	1	28
5 Midlothian	17	1	10	5	0	4	22	1	14
6 Parham Rd.	11	2	8	15	1	16	26	3	24
7 9-Mile Rd.	8	0	5	7	0	7	15	0	12
Central Area Total	77	10	58	65	1	86	142	11	144
Eastern Area									
1 Independence	5	1	1	3	0	2	8	1	3
2 Kempsville	38	3	10	22	2	37	60	5	47
3 Chesapeake	31	4	14	9	1	22	40	5	36
4 Portsmouth	3	2	6	4	0	14	7	2	20
5 Route 170	7	2	6	4	0	5	11	2	11
6 Laskin	25	2	13	8	0	18	33	2	31
7 Brambleton	14	2	14	10	0	30	24	2	44
8 Military Circle	18	3	24	23	0	37	41	3	61
9 Denbigh	28	2	11	18	0	39	46	2	50
10 Hampton	7	0	15	5	1	19	12	1	34
11 Route 143	12	0	13	13	0	12	25	0	25
Eastern Area Total	188	21	127	119	4	235	307	25	362
Urban Total	422	52	287	290	19	523	712	71	810
Grand Total									1593

*C = correct use; I = incorrect use, N = none.

Table B-4
1997 Survey Results of Safety Restraint Use by Occupants 4 to 16 Years of Age in Mid-Size Cities

Site Location	Front Seat			Rear Seat			Total Vehicle		
	C*	I	N	C	I	N	C	I	N
Charlottesville									
1 High St	28	2	19	20	1	24	48	3	43
2 Emmet	9	3	11	8	2	25	17	5	36
Charlottesville Total	37	5	30	28	3	49	65	8	79
Danville									
1 Main	2	1	14	0	0	23	2	1	37
2 Piney Forest	4	0	21	8	0	25	12	0	46
DanvilleTotal	6	1	35	8	0	48	14	1	83
Lynchburg									
1 Chandler Mtn	4	1	8	2	0	8	6	1	16
2 Oakley	7	2	17	9	0	28	16	2	45
3 Old Forest	15	1	10	7	0	16	22	1	26
Lynchburg Total	26	4	35	18	0	52	44	4	87
Mid-Size City Total	69	10	100	54	3	149	123	13	249
Grand Total									385

*C = correct use; I = incorrect use, N = none.

APPENDIX C

Rates of Safety Restraint Use by Areas of State Surveyed

Table C-1
1997 Child Safety Seat Use (%) in Metropolitan Areas by Area of State and Seat Position

Total Vehicle

	Northern	Eastern	Central	Western	Combined
Correct	57.0	53.1	58.7	32.1	54.1
Incorrect	18.5	17.8	14.1	17.9	17.4
None	24.5	29.1	27.2	50.0	28.5

Front Seats

	Northern	Eastern	Central	Western	Combined
Correct	38.5	41.0	45.5	0.0	37.9
Incorrect	23.1	20.5	13.6	25.0	20.0
None	38.5	38.5	40.9	75.0	42.1

Rear Seats

	Northern	Eastern	Central	Western	Combined
Correct	60.8	55.7	62.9	45.0	58.1
Incorrect	17.6	17.2	14.3	15.0	16.7
None	21.6	27.0	22.9	40.0	25.2

Table C-2
1997 Child Safety Seat Use (%) in Mid-size Cities by Locality and Seat Position

Total Vehicle

	Danville	Lynchburg	Charlottesville	Combined
Correct	23.8	48.4	51.7	43.2
Incorrect	14.3	16.1	13.8	14.8
None	61.9	35.5	34.5	42.0

Front Seats

	Danville	Lynchburg	Charlottesville	Combined
Correct	0.0	60.0	33.3	33.3
Incorrect	0.0	0.0	0.0	0.0
None	100.0	40.0	66.7	66.7

Rear Seats

	Danville	Lynchburg	Charlottesville	Combined
Correct	29.4	46.2	53.8	44.9
Incorrect	17.6	19.2	15.4	17.4
None	52.9	34.6	30.8	37.7

Table C-3
1997 Safety Restraint Use (%) by Occupants 4 to 16 Years of Age in Metropolitan Areas

Total Vehicle

	Northern	Eastern	Central	Western	Combined
Correct	47.1	44.2	47.8	32.9	44.7
Incorrect	5.9	3.6	3.7	5.6	4.5
None	47.1	52.2	48.5	61.5	50.8

Front Seats

	Northern	Eastern	Central	Western	Combined
Correct	59.9	56.0	53.1	44.1	55.5
Incorrect	9.0	6.3	6.9	2.9	6.8
None	31.1	37.8	40.0	52.9	37.7

Rear Seats

	Northern	Eastern	Central	Western	Combined
Correct	36.0	33.2	42.8	22.7	34.9
Incorrect	3.2	1.1	0.7	8.0	2.3
None	60.7	65.6	56.6	69.3	62.9

Table C-4
1997 Safety Restraint Use (%) by Occupants 4 to 16 Years of Age in Mid-size Cities

Total Vehicle

	Danville	Lynchburg	Charlottesville	Combined
Correct	14.3	32.6	42.8	31.9
Incorrect	1.0	3.0	5.3	3.4
None	84.7	64.4	52.0	64.7

Front Seats

	Danville	Lynchburg	Charlottesville	Combined
Correct	14.3	40.0	51.4	38.5
Incorrect	2.4	6.2	6.9	5.6
None	83.3	53.8	41.7	55.9

Rear Seats

	Danville	Lynchburg	Charlottesville	Combined
Correct	14.3	25.7	35.0	26.2
Incorrect	0.0	0.0	3.8	1.5
None	85.7	74.3	61.3	72.3

Table C-5
1997 Child Booster Seat Survey Results by Area and Seat Position

Site Location	Front Seats			Rear Seats			Total Vehicle		
	C*	I	N	C	I	N	C	I	N
Northern Area	3	0	0	10	2	0	13	2	0
Western Area	1	1	0	1	1	0	2	2	0
Central Area	1	0	0	8	1	0	9	1	0
Eastern Area	1	0	0	14	3	0	15	3	0
Charlottesville	0	1	0	5	1	0	5	2	0
Danville	0	0	0	2	0	0	2	0	0
Lynchburg	1	0	0	2	0	0	3	0	0
Total	7	2	0	42	8	0	49	10	0
Rate of Use (%)	77.8	22.2	0.0	84.0	16.0	0.0	83.1	16.9	0.0
Grand Total									59

*C = correct use; I = incorrect use, N = none.

Table C-6
1996 Child Safety Seat Use (%) in Metropolitan Areas by Area and Seat Position

Total Vehicle

	Northern	Eastern	Central	Western	Combined
Correct	61.2	52.2	47.4	52.8	55.0
Incorrect	6.1	11.5	9.8	5.6	8.5
None	32.7	36.3	42.9	41.7	36.5

Front Seats

	Northern	Eastern	Central	Western	Combined
Correct	50.0	44.6	35.1	47.4	44.4
Incorrect	6.0	14.3	13.5	5.3	10.5
None	44.0	41.1	51.4	47.4	45.1

Rear Seats

	Northern	Eastern	Central	Western	Combined
Correct	63.3	54.2	52.1	54.7	57.7
Incorrect	6.2	10.7	8.3	5.7	8.0
None	30.5	35.0	39.6	39.6	34.2

Table C-7
1994 Child Safety Seat Use (%) in Metropolitan Areas by Area and Seat Position

Total Vehicle

	Northern	Eastern	Central	Western	Combined
Correct	59.6	78.6	48.8	58.6	64.0
Incorrect	10.3	7.6	12.2	20.7	10.4
None	30.1	13.8	39.0	20.7	25.7

Front Seats

	Northern	Eastern	Central	Western	Combined
Correct	45.6	58.1	43.8	50.0	49.3
Incorrect	12.3	14.0	9.4	20.0	12.7
None	42.1	27.9	46.9	30.0	38.0

Rear Seats

	Northern	Eastern	Central	Western	Combined
Correct	64.7	86.2	52.0	63.2	70.1
Incorrect	9.6	5.2	14.0	21.1	9.4
None	25.6	8.6	34.0	15.8	20.5

Table C-8
1993 Child Safety Seat Use (%) in Metropolitan Areas by Area and Seat Position

Total Vehicle

	Northern	Eastern	Central	Western	Combined
Correct	41.9	57.5	47.5	44.4	48.9
Incorrect	21.9	10.1	13.9	33.3	17.5
None	36.3	32.4	38.6	22.2	33.6

Front Seats

	Northern	Eastern	Central	Western	Combined
Correct	27.6	46.0	55.2	23.5	40.8
Incorrect	27.6	16.0	6.9	17.7	16.8
None	44.8	38.0	37.9	58.8	42.4

Rear Seats

	Northern	Eastern	Central	Western	Combined
Correct	45.0	62.0	44.4	52.2	51.6
Incorrect	20.6	7.8	16.7	39.1	17.7
None	34.4	30.2	38.9	8.7	30.7