

**FINAL REPORT**

**URBAN SAFETY RESTRAINT USE BY INFANTS AND CHILDREN  
UNDER 16 YEARS OF AGE IN VIRGINIA: THE 2002 SURVEY RESULTS**

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## EXECUTIVE SUMMARY

The Virginia Transportation Research Council has been monitoring the use of child safety restraint systems in Virginia since 1983 through annual child safety seat surveys. The original Virginia Child Restraint Law passed in 1982 required that children under 4 years of age use a child safety seat. Children in this age cohort who weighed at least 40 pounds or were at least 40 inches tall could use a standard safety belt. In 1997, Sections 46.2-1094 and 46.2-1095 of the *Code of Virginia* were changed to require that all rear seat occupants use safety restraints. In its 2000 session, the Virginia General Assembly extended the provisions of these bills to include all children under age 16 regardless of seating position. Finally, in 2002, the legislature amended Section 46.2-1095 so that “Any person who drives on the highways of Virginia any motor vehicle manufactured after January 1, 1968, shall ensure that any child, *through age five*, whom he 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” [emphasis added]. In addition, Section 46.2-1100 stipulated that “The use of a seat belt . . . shall not violate this article if (i) the affected child is at least four years old but less than six years old and (ii) the weight and size of the child is such as to make the use of such seat belt practical and the use of an approved child restraint impractical.”

The principal goal of this child restraint survey has always been to estimate compliance with the relevant statutes in place at the time. Each summer, data were collected in the four metropolitan areas of the state (northern, eastern, central, and western) at the same sites, on the same day of the week, and at the same hour of the day. In 1997, sites in three mid-size cities with a population between 50,000 and 100,000 were added, as was data collection on safety belt use by occupants under 16 years of age. In 2002, additional sites in the existing mid-size cities were added to increase the sample size and a new mid-size city, Harrisonburg, was added. In addition, in 2002, the age categories in the survey were changed to (1) infants and toddlers 0 through 3 years old, (2) preschoolers 4 through 5 years old, and (3) children 6 through 15 years old. These categories allowed the investigators to continue to analyze the longitudinal restraint use data and to evaluate the impact of the legislative changes made in 2002.

In this survey, safety belt and child safety seat use are broken into three categories for purposes of analysis: correct use, incorrect use, and nonuse. Correct use and non-use were easy to identify consistently. Incorrect use, although defined the same way every year, was more difficult to determine consistently, since data collectors made these determinations from outside the vehicle. Conditions under which the observer made the incorrect use determination differed with regard to how long observers had to make the determination, how close they were to the vehicle, how easy it was for them to see the seat (based on seat and interior color, level of window tinting, and ambient lighting), and how diligent they were in ferreting out incorrect use. Since determining incorrect use involves a degree of subjectivity, this number may vary from year to year based solely on the fact that different observers collected the data. For this reason, total use rates are defined as correct plus incorrect use and represent a rate not biased by the variability inherent in making the correct/incorrect discrimination.

The analysis presented in this report is similar to those in previous years in that it focuses on children less than 4 years old and children 4 through 15 years old. The emphasis was

continued in the 2002 survey report, since the most recent changes in the restraint laws for children had been in effect less than 1 month when the 2002 survey was begun. The 2003 report will focus on children under 6 years and children 6 through 15 years of age to reflect the new child restraint requirements, which will have been in effect for just over 1 year at the time of the next survey.

A total of 2,823 children were observed during the 2002 survey: 594 under age 4 and 2,229 children 4 through 15 years of age. In 2002, total child safety seat use for metropolitan areas and mid-size cities combined was 93.2% and correct use was 70.8%. Total seat belt use among 4 through 15 year olds in metropolitan areas and mid-size cities combined was 65.6%, and correct use was 55.4%.

### Child Safety Seat Use in the Metropolitan Areas

As seen in Figure ES-1, total and correct safety seat use rates for 0 through 3 year olds in metropolitan areas followed a similar pattern between 1993 and 2000. In 1999 and 2000, both exceeded 80%. However, in 2001, correct use dropped to 69.5% whereas total use increased to 85.6%. Almost all of the drop in correct metropolitan use rates was accounted for by a 13% increase in incorrect use. This trend continued in 2002, with correct use at 68.4% and total use at 91.0%. This case illustrates how random or data collector-related variation in incorrect use can directly affect the correct use figures and how total use is a better and more stable indicator of compliance.

As seen in Figure ES-2, 2002 total use rates were above 90% in all regions, and non-use was less than 10% in all metropolitan regions. Again, the variation between regions in correct and incorrect use unnecessarily distorts the results, presenting a less accurate picture of compliance.

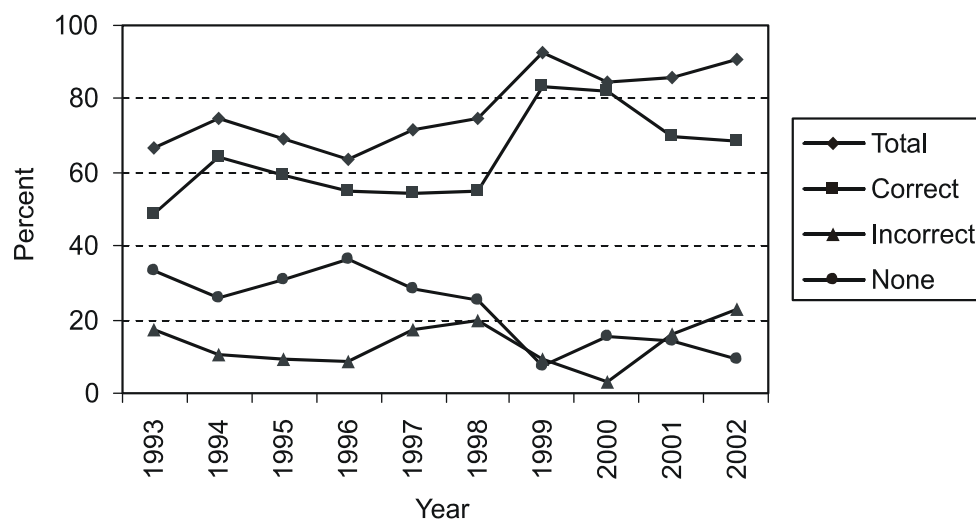
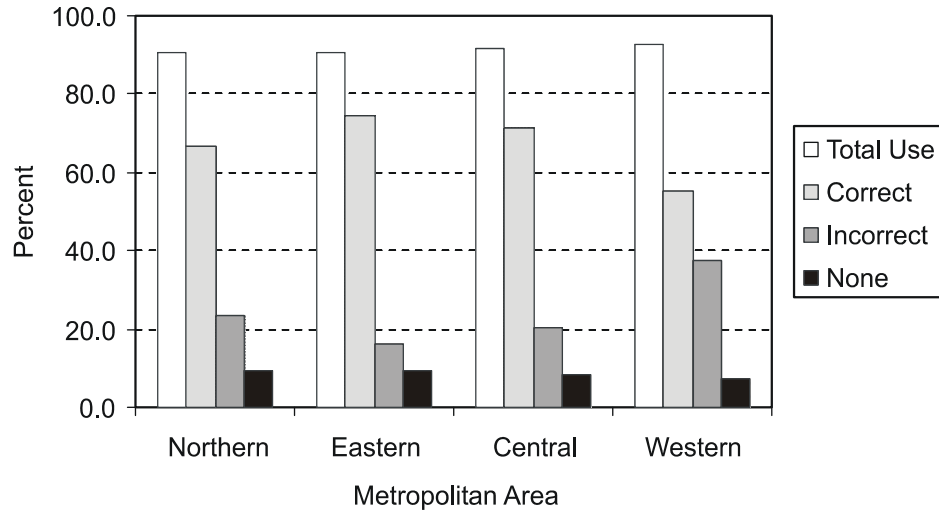


Figure ES-1. Child Safety Seat Use Rates for Children Under Age 4 in All Metropolitan Areas (1993-2002)

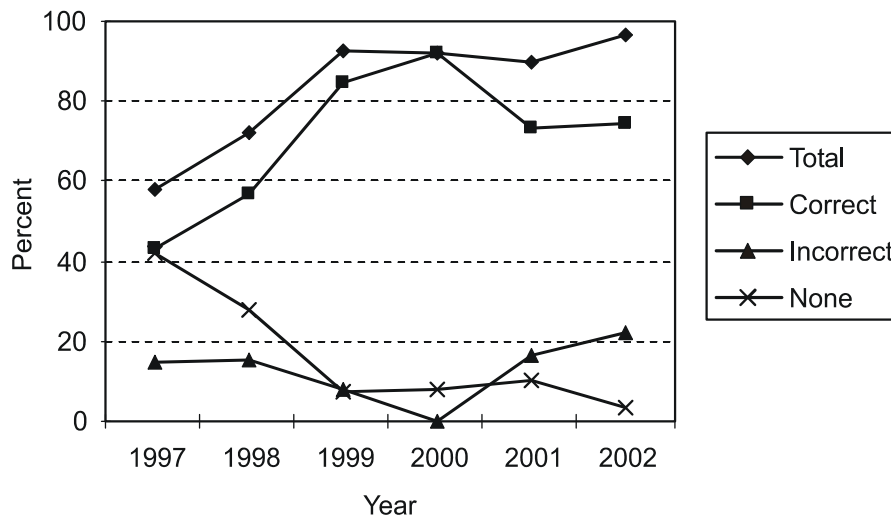


**Figure ES-2. 2002 Safety Seat Use Rates for Children Under Age 4 by Metropolitan Area**

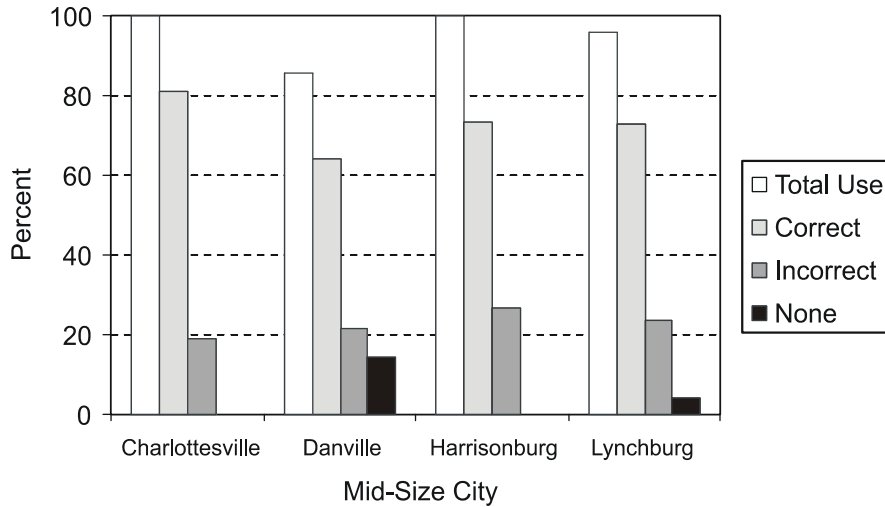
### Child Safety Seat Use in Mid-Size Cities

Child safety seat use rates among 0 through 3 year olds in mid-size cities followed a pattern similar to that for metropolitan areas (Figure ES-3). By 1999, total use had increased and non-use had decreased, with variations in correct and incorrect use generally canceling each other out. In 2002, total use rates for all mid-size cities increased to 96.3%, and correct use dropped from the 1999 high of 92.7% to 74.3%.

As seen in Figure ES-4, 2002 total use rates increased to 100% in Charlottesville. In its first year in the survey, Harrisonburg also posted a total use rate of 100%. In Danville, the mid-size city with the lowest total use rate, the total rate increased to 85.7%. These results are based on larger sample sizes than in any of the previous years.



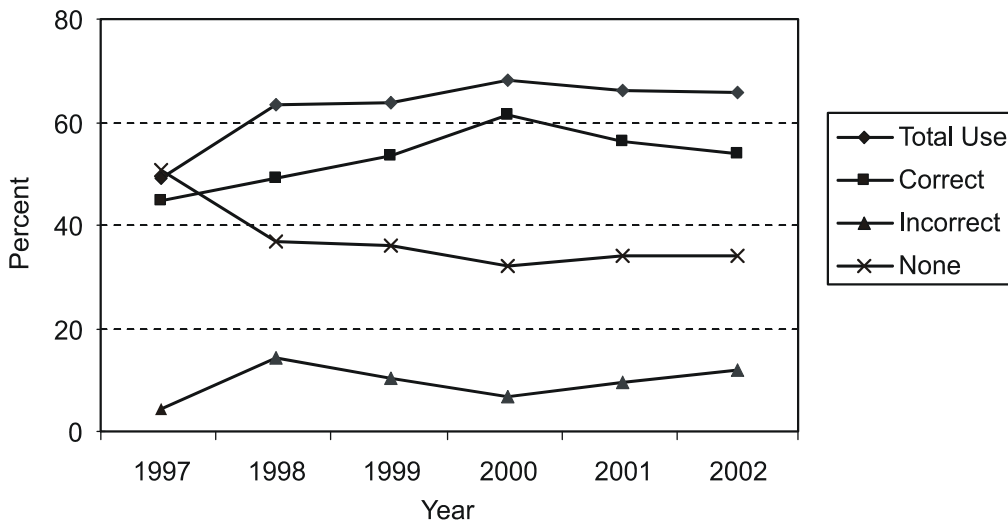
**Figure ES-3. Child Safety Seat Use Rates for Children Under Age 4 for All Mid-Size Cities (1997-2002)**



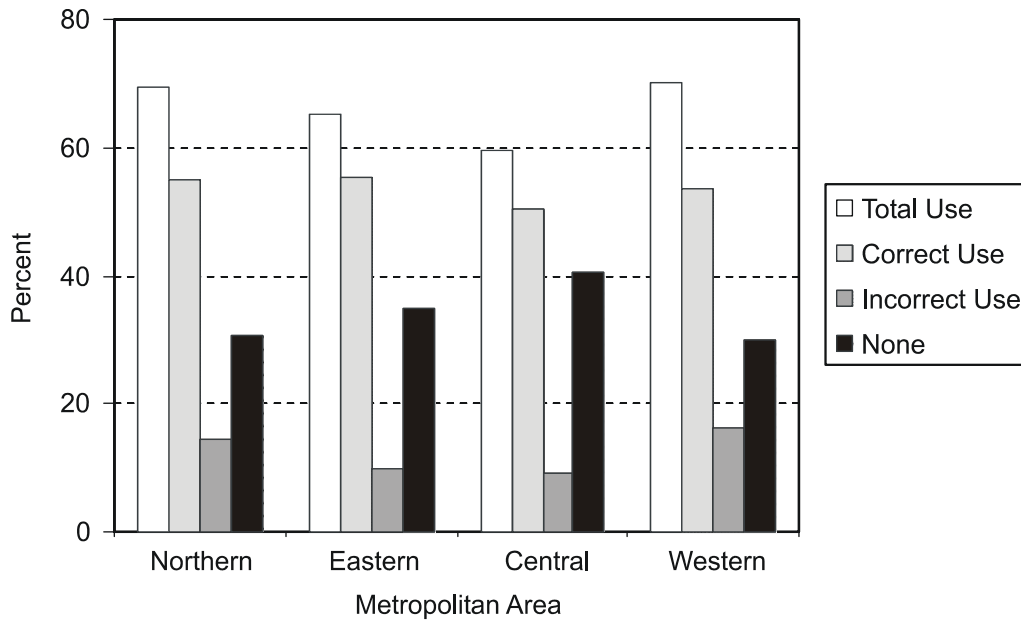
**Figure ES-4. 2002 Child Safety Seat Use Rates for Children Under Age 4 by Mid-Size City**

### Safety Belt Use Among 4 Through 15 Year Olds in the Metropolitan Areas

For occupants 4 through 15 years of age, total safety belt use rates in the metropolitan areas of the state increased from 49.2% in 1997 to 68.0% in 2000 but fell to 65.8% in 2002 (Figure ES-5). Correct use in all metropolitan areas combined peaked in 2000 at 61.3% but fell to 53.8% by 2002. As seen in Figure ES-6, in 2002, total seat belt use rates were highest in the western area of the state and lowest in the central area, a decided change from previous years. Total use fell in the central area from 65% in 2001 to 59.5% in 2002, and total use increased in the western area from 60.9% in 2001 to 70.0% in 2002, with correct use increasing by about 9 points.



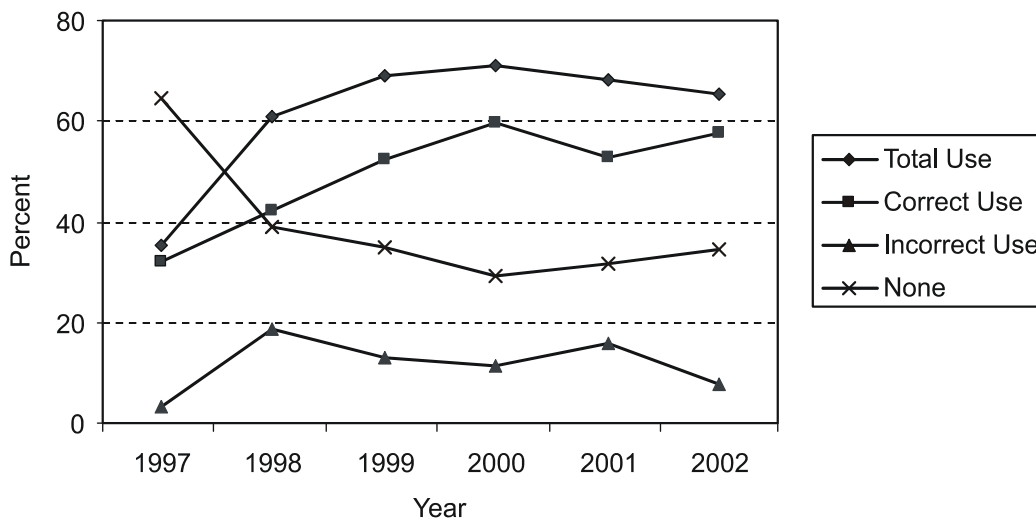
**Figure ES-5. Safety Belt Use Rates for 4 Through 15 Year Olds in Metropolitan Areas (1997-2002)**



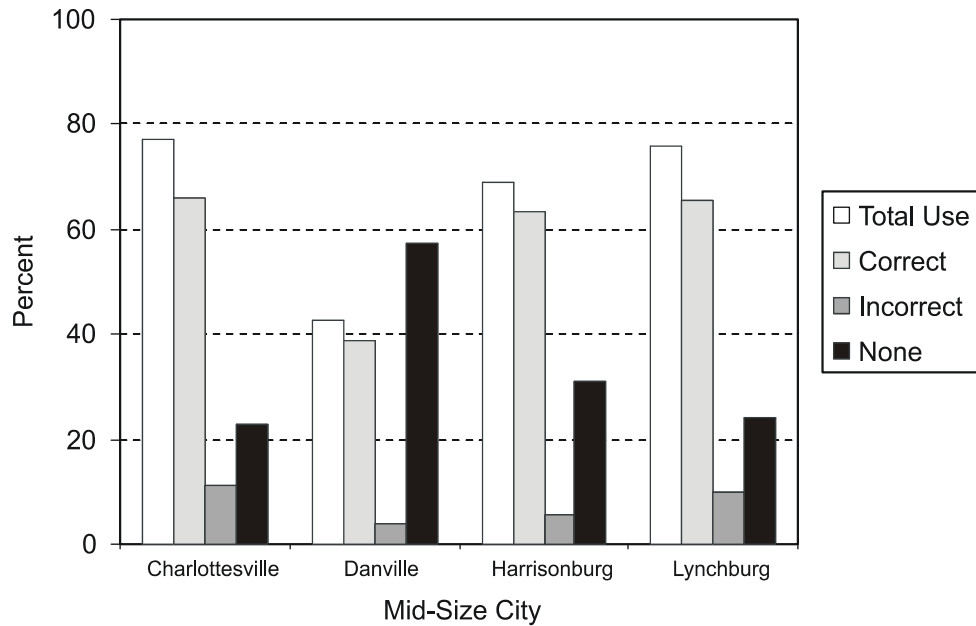
**Figure ES-6. 2002 Safety Belt Use Rates for 4 Through 15 Year Olds by Metropolitan Area**

### Safety Belt Use Among 4 Through 15 Year Olds in Mid-Size Cities

For occupants age 4 through 15 years in mid-size cities, total and correct restraint use had risen from the low- to mid-30s in 1997 to 71.0% and 59.8%, respectively, in 2000. Both declined in 2001, total use by 2.8 points and correct use by 7.2 points. In 2002, correct use rebounded to 57.7% and incorrect use fell to its lowest level since 1998 (7.6%), resulting in a moderate decrease of 3 points in total use to 65.3% (Figure ES-7). As seen in Figure ES-8, the total 2002 use rates varied from 42.6% in Danville to 77.0% in Charlottesville.



**Figure ES-7. Safety Belt Use Rates for 4 Through 15 Year Olds in Mid-Size Cities (1997-2002)**



**Figure ES-8: 2002 Safety Belt Use Rates for 4 Through 15 Year Olds by Mid-Size City**

### Seating of Children in Motor Vehicles

Starting in 1997, safety advocates began recommending that young children be placed in the back seats of vehicles. Because the data for this survey include the child’s position in the vehicle, whether adults are taking these recommendations seriously can be determined. The proportion of children under age 4 riding in the front seat decreased from 19.6% in 1997 to 5.8% in 2002 in the metropolitan areas and from 14.8% to 6.7% in the mid-size cities over the same time period. A larger percentage of children aged 4 through 15 years sit in the front seat, but the percentage declined modestly in 2002, from 47.8% in 1997 to 33.6% in the metropolitan areas and from 46.5% to 40.8% in mid-size cities over the same time period.

### Recommendations

1. *With the 2002 changes in the child restraint laws requiring safety or booster seat use for children under 6 years of age, parents, guardians, and other drivers transporting young children need more guidance in determining when to move a child from a safety seat to a booster seat and from a booster seat to a safety belt. This is crucial since the 2002 amendments removed the specific height and weight criteria for safety seat vs. safety belt use (40 pounds or 40 inches) and simply state that 4 through 5 year olds will use a safety seat unless their weight or height make the use of an approved child restraint “impractical.” It is recommended that the Virginia Department of Health’s Office of Injury Prevention publicize such guidelines and perhaps require that they be posted in businesses selling child or booster seats.*



2. *Since child seat and safety belt use rates are very low for 4 through 15 year olds, this group needs more attention.* The Virginia Department of Health in cooperation with the Virginia Department of Education should develop campaigns aimed specifically at the guardians of 4 through 5 year olds and both guardians of and children aged 6 through 15 years. For programs used in school to increase awareness among 6 through 15 year olds, emphasis should be placed on designing the materials and activities such that they also meet the standards of learning for the state health and driver education curricula.
3. *The total use rate, rather than the correct use rate, should be the primary measure of compliance with the child safety restraint laws since incorrect use is too difficult to identify consistently from outside the vehicle.* Total use, which includes correct and incorrect use, is a more objective statistic.
4. *Once data for a sufficient number of years have been collected, the primary measurement of restraint use should focus on the 0 through 5 age group and the 6 through 15 age group to reflect the 2002 changes in the safety seat use laws.*

## FINAL REPORT

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## INTRODUCTION

The Virginia Transportation Research Council has been tracking the use of child safety restraint systems for the Commonwealth since 1983. Child safety seat surveys have been conducted annually (except in 1995) to measure the frequency of use and to make the findings available to state officials. The surveys have varied in detail and scope, but the principal goal has always been to estimate compliance with the relevant statutes in place at the time. 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.

Because the sites used in the survey were not selected at random, the survey results cannot be used as estimates of *statewide* infant and child restraint use. However, these child safety restraint surveys provide a snapshot of child restraint system usage at the urban and mid-size city sites. Taken together, they give safety program administrators and public officials an idea concerning changes in use rates over time.

## BACKGROUND

The original child restraint law passed in Virginia in 1982 required that children under 4 years of age use a child safety seat, except for those who weighed at least 40 pounds or were at least 40 inches tall, who could use a standard safety belt. In 1997, Sections 46.2-1094 and 46.2-1095 of the *Code of Virginia* were changed to require that all rear seat occupants use safety restraints. In its 2000 session, the Virginia General Assembly extended the provisions of these laws to include all children under age 16 regardless of seating position. Finally, in 2002, the legislature amended Section 46.2-1095 so that "Any person who drives on the highways of Virginia any motor vehicle manufactured after January 1, 1968, shall ensure that any child, *through age five*, whom he 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" [emphasis added]. In addition, Section 46.2-1100 stipulated that "The use of a

seat belt . . . shall not violate this article if (i) the affected child is at least four years old but less than six years old and (ii) the weight and size of the child is such as to make the use of such seat belt practical and the use of an approved child restraint impractical.”

## PURPOSE AND SCOPE

The principal goal of this child restraint survey was to estimate compliance with the relevant statutes so that the VDH can evaluate previous efforts to increase restraint use and develop new programs for target audiences.

## METHODS

The 2002 child safety seat survey replicated the method used in previous surveys. Data were collected from the four metropolitan areas of the state (northern, eastern, central, and western) at the same sites, on the same day of the week, and at the same hour of the day as in previous summers. As in previous surveys, 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). In addition, data were collected at 8 sites in Danville, 9 in Lynchburg, 6 in Charlottesville, and 6 in Harrisonburg. This reflects an increase in the sample size in the original 3 mid-size cities, and the addition of Harrisonburg as the 4<sup>th</sup> mid-size city. The resulting increases in sample size will provide more reliable and valid estimates of child restraint use.

Data were collected from 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 cars stopped for the red signal, the observers left the curb and approached the car from the passenger side front fender. Each team member 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 cars surveyed. At some intersections, it was possible to observe only 5 or 6 vehicles because of the signal timing or vehicle volume at the site. As required by state policy, each team member wore a hard hat and an orange safety vest. Data were collected during 1.5-hour periods between 7:30 and 5:30 P.M. There were two persons on the survey team—each working on a different leg of the intersection, each trained on the data collection protocol described here, and each trained on how to identify the factors that constitute correct and incorrect use.

Because of changes in the *Code of Virginia*, the survey was based on three age categories, rather than two. According to the *Code*, children under 6 years of age are required to use child safety seats. (The *Code* allows larger children 4 through 5 years of age to move from safety seats to booster seats or safety belts if it is impractical for them to use a child safety seat.) Children aged 6 through 15 continue to be required to use safety belts. The data collectors were

trained on how to discriminate among children under age 4, those aged 4 through 5, and those 6 through 15 years of age. Data collectors were taken to shopping malls, toy stores, parking lots, and other areas where children were likely to be and asked to “guess” the age and weight of young children. The supervisor then approached the adult accompanying the child, explaining the survey and asking for the actual age and weight of the child. Thus, data collectors were able to learn from their successes and failures to identify which age group was appropriate for each child. Training continued until all data collectors were able to identify the age group correctly independent of the other observers and until all the data collectors agreed on the age group. During the 2002 survey, training took approximately 6 hours.

To distinguish persons in the three age groups, an “I” for infant was used for those under age 4, a “PS” for preschooler was used for those aged 4 through 5, and a “C” for child was used for those aged 6 through 15 inclusive. An “SS” was used to designate a child safety seat, and an “L” was used to designate lap/shoulder belts. No attempt was made to distinguish between child safety seats and booster seats. In addition, the data collection form was redesigned to make the recording of information easier and more accurate and to make data entry easier (see Figure 1 for the data collection form used in 2002).

Child seat and safety belt use were recorded as correct (C), incorrect (I), or non-use (N). Only those features easily identifiable from outside the vehicle were used to determine whether use was correct or incorrect. These features included the use of arm bars/shields, a seat harness properly clipped between the legs of the child, a seat facing in the proper direction for the age of the child, a lap/shoulder belt routed through the child seat, and a chest clip 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 the surveyor to record the use as incorrect. Non-use was recorded if (1) a child under age 6 was in the car and no safety or booster seat was present, a seat was present but was not being used, or a lap belt was being used inappropriately in place of a safety seat, or (2) a child aged 6 through 15 was in the vehicle and was unrestrained. Safety belt use was also recorded as correct, incorrect, and non-use. Incorrect safety belt use was defined as a shoulder belt obviously loose, behind the back, or under the arm. Correct use was recorded for all other situations.

The reader should be cautioned that throughout this report, rates of reported *correct* use are likely to be overestimated because of the method of observation and the definition of *correct usage*. With an in-traffic survey, the lap/shoulder belt holding the child seat in place cannot be checked for proper tension. Incorrect use, although defined the same way every year, is very difficult to determine consistently. It depends largely on how long the observer has to make the determination, how close he or she is to the vehicle, and how easily he or she can see the seat (based on the seat, interior color, and ambient lighting). Since determining incorrect use involves a subjective judgment, the rate may vary from year to year based solely on the fact that different observers collected the data. For this reason, total use rates, which are defined as correct plus incorrect use and which are not affected by subjectivity and the resultant variability of the correct/incorrect use determination, are considered to be the most accurate reflection of compliance with the child restraint laws.

# CHILD SAFETY SEAT SURVEY

Summer 2002

Area \_\_\_\_\_ Site \_\_\_\_\_ @ \_\_\_\_\_ Sheet # \_\_\_\_\_

Diagram 1: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 2: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 3: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 4: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 5: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 6: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 7: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 8: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 9: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

Diagram 10: Front seat (Yes/No), I PS Child, I PS Child; Back seat (C IN, C IN, C IN, SS L, SS L, SS L); Back Seats Not Visible checkbox.

I = Infant 0-3 yrs. Inclusive    P = Preschool 4-5 yrs. Inclusive    Child = 6-15 yrs. Inclusive    SS = Safety seat    L = Lap/Shoulder

Usage: I = Incorrect    C = Correct    N = Nonuse

Figure 1. Data Collection Form

## **RESULTS**

The analysis presented in this report is similar to analyses conducted in previous years in that it focuses on children under 4 years old and children 4 through 15 years old. The emphasis was continued in the 2002 survey report, since the most recent changes in the restraint laws for children had been in effect less than 1 month when the 2002 survey was begun. Although this report presents some of the data for other age categories, the 2003 report will focus on children under 6 years and children 6 through 15 years of age to reflect the new child restraint requirements, which will have been in effect for just over 1 year at the time of the next survey.

### **Characteristics of the 2002 Sample**

Starting in 1997, safety advocates began recommending that children occupy rear seats only. Because the data from this survey include the child's position in the vehicle, whether adults are taking these recommendations seriously could be determined.

A total of 2,823 children were observed during the data collection period—594 children under age 4 and 2,229 aged 4 through 15. A total of 361 occupants under age 4 were observed in the metropolitan areas, 21 in the front seat and 340 in the rear seat. In the mid-size cities, 17 were in the front seat and 237 in the rear seat, for a total of 254 observations.

Safety restraint use data were collected on 1,280 occupants 4 through 15 years of age in the four metropolitan areas, with 33.6% sitting in the front seat. In the mid-size cities, 949 children in this age group were observed, with 40.8% in the front seat.

### **Child Safety Seat Use in Metropolitan Areas**

The safety seat use rates for children under age 4 recorded during the 1993 to 2002 surveys are shown in Figure 2. Total and correct use rates for metropolitan areas followed a similar pattern between 1993 and 2000. In 1999 and 2000, both exceeded 80%. However, in 2001, correct use dropped to 69.5% whereas total use remained above 80% at 85.6%. Almost all of the drop in the correct use rates was accounted for by a 13% increase in incorrect use. This decline in correct use continued into 2002 to 68.4%, whereas total use continued to increase to 91.0%.

A breakdown of the data by metropolitan area showed that more than 90% of children under age 4 in each area used child restraints in some manner, and in all areas except the western area, more than 60% used them correctly (Figure 3). Total use ranged from 92.5% in the western area to 90.5% in the northern area, and correct use ranged from 55% in the western area to 74.5% in the eastern metropolitan area.

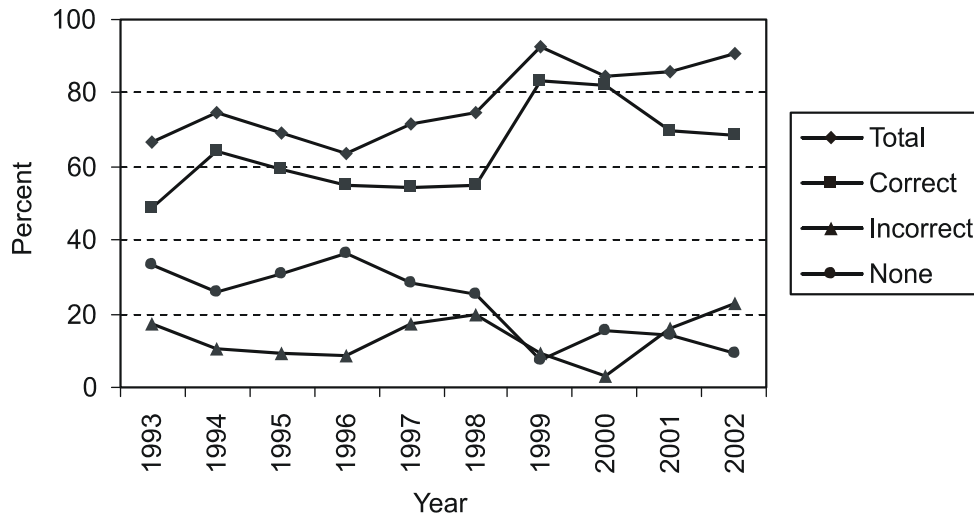


Figure 2. Safety Seat Use Rates for Children Under Age 4 for All Metropolitan Areas (1993-2002)

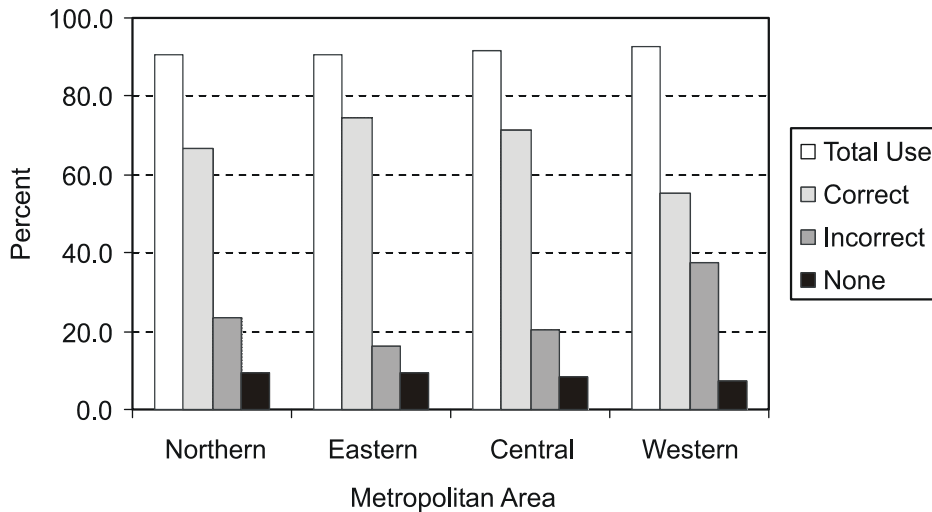
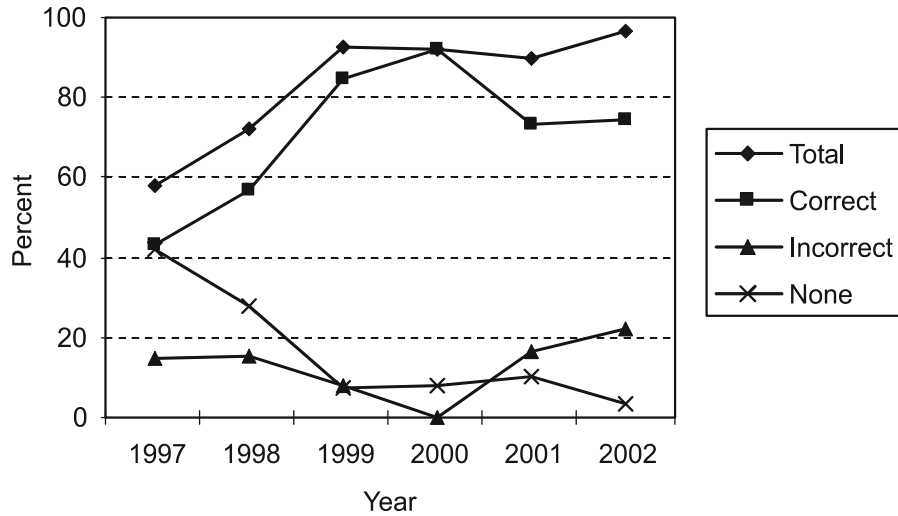


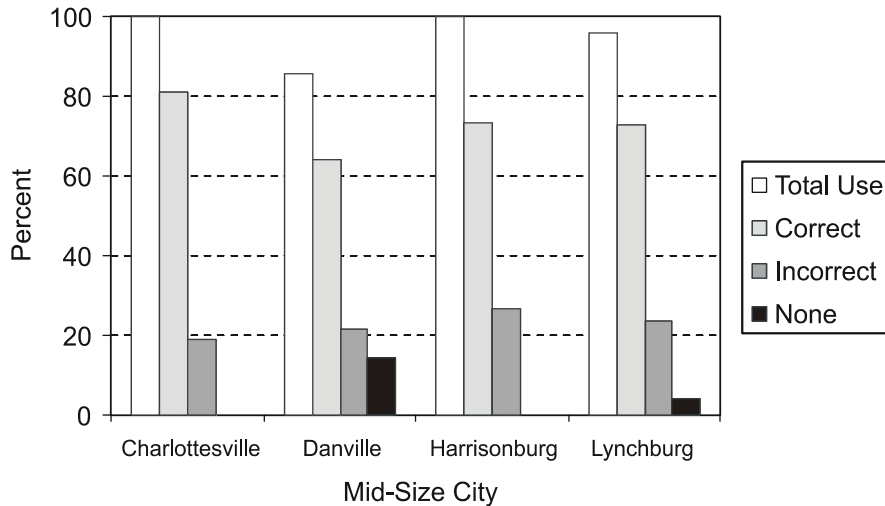
Figure 3. 2002 Safety Seat Use Rates for Children Under Age 4 by Metropolitan Area

### Child Safety Seat Use in the Mid-Size Cities

The safety seat use rates recorded in mid-sized cities during the 1997 to 2002 surveys are shown in Figure 4. Use rates in mid-sized cities peaked in 1999 and 2000, with total and correct use rates reaching 92%. In 2001, total use declined by 2.4 points and correct use declined by about 19 points to 73.1%, with most of the decrease accounted for by an almost 17% increase in incorrect use. Thus, the changes in correct and incorrect use essentially cancelled each other out. The same disparity between total and correct use continued into 2002, with total use increasing to 96.3% and correct use remaining in the 70s, at 74.3%. As seen in Figure 5, 2002 total use rates varied from 100% in Charlottesville and Harrisonburg to 85.7% in Danville. These findings are based on increased sample sizes in all mid-size cities, improving their reliability and validity.



**Figure 4. Safety Seat Use Rates for Children Under Age 4 for All Mid-Size Cities (1997-2002)**



**Figure 5. 2002 Safety Seat Use Rates for Children Under Age 4 by Mid-Size City**

### **Safety Belt Use by Occupants 4 Through 15 Years of Age in the Metropolitan Areas**

For occupants 4 through 15 years of age, total safety belt use rates in the metropolitan areas of the state increased from 49.2% in 1997, the first year of data collection for this age group, to a high of 68.0% in 2000; fell slightly in 2001; and continued to fall in 2002 to 65.8% (Figure 6). Correct use also peaked in 2000 at 61.3% and fell to 53.8% in 2002.

The 2002 safety belt use rates for each metropolitan area are shown in Figure 7. Total use rates were highest in the western area (70.0%) and lowest in the central area (59.5%). Total use fell in the central area from 65% in 2001 to 59.5% in 2002 and increased in the western area from 60.9% in 2001 to 70.0% in 2002. Correct use was highest in the eastern area (55.5%) and lowest in the central area (50.4%).



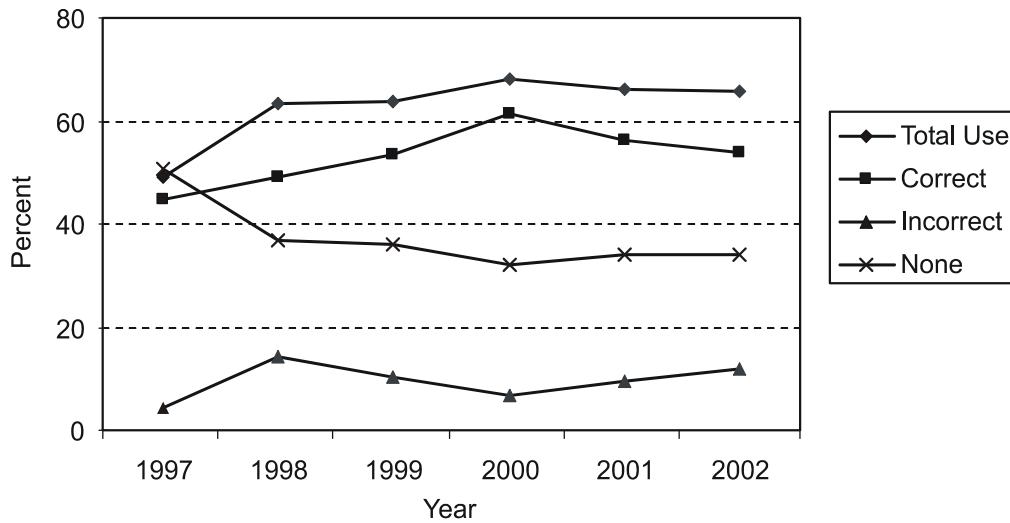


Figure 6. Safety Belt Use Rates for 4 Through 15 Year Olds in Metropolitan Areas (1997-2002)

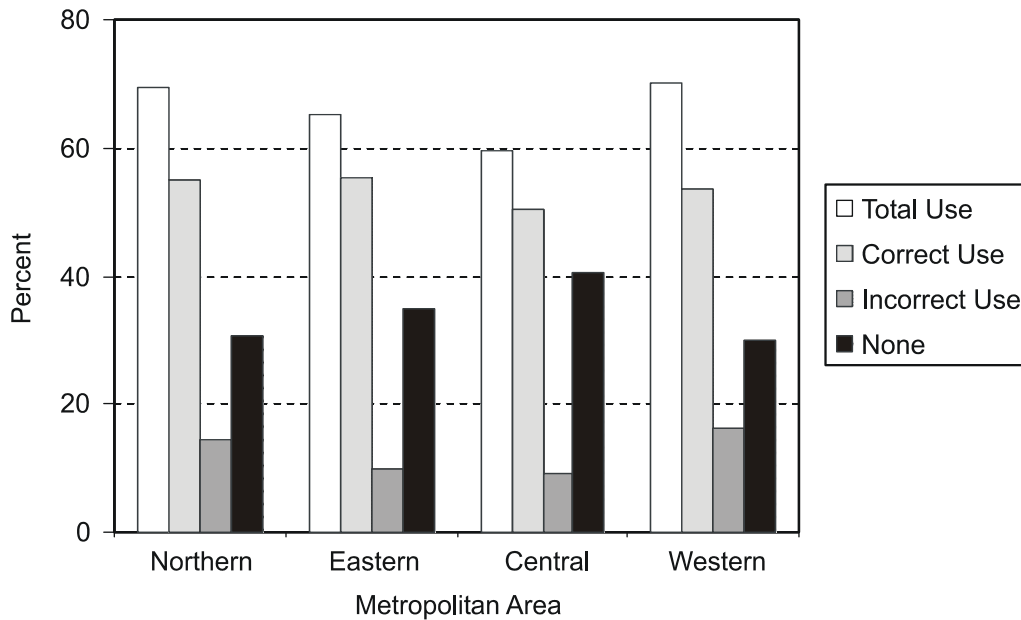
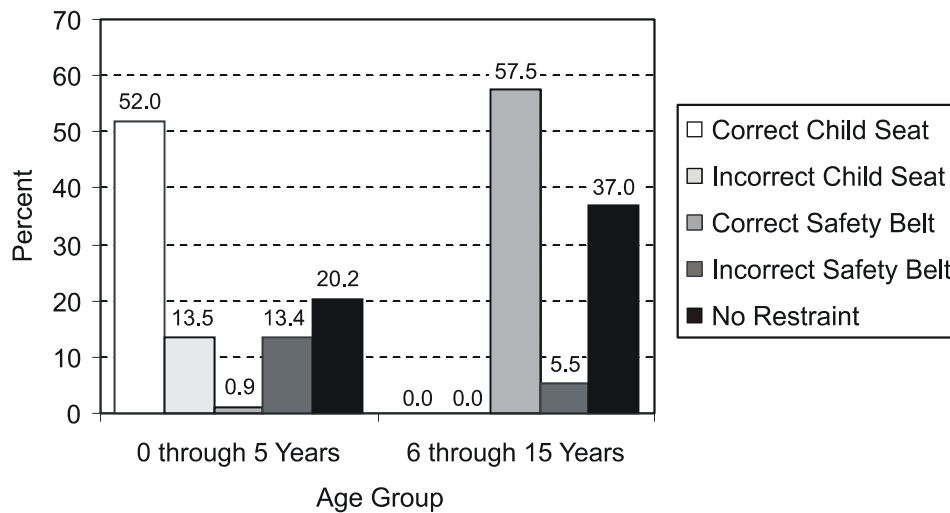


Figure 7. 2002 Safety Belt Use Rates for 4 Through 15 Year Olds by Metropolitan Area

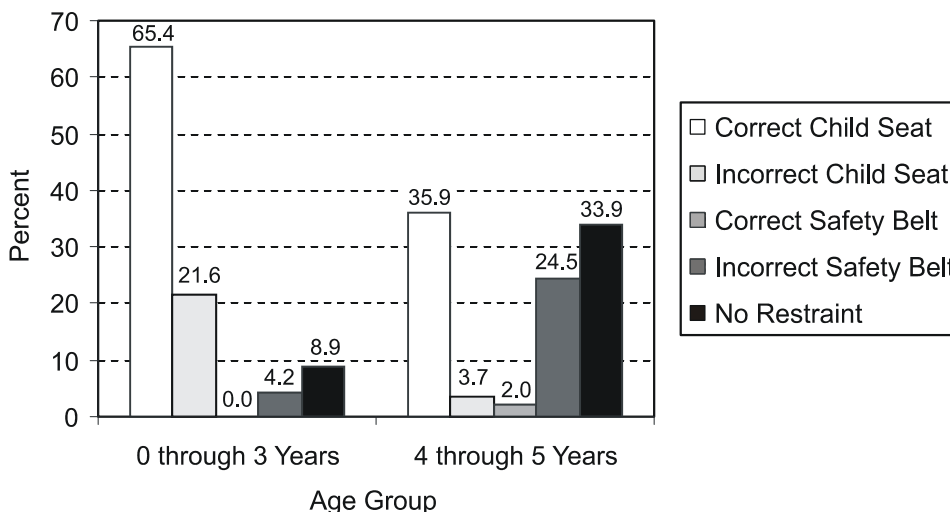
### Metropolitan Restraint Use Among Children in Other Age Categories

Figures 6 and 7 present only safety belt use data for 4 through 15 year olds. Data on child safety seat use among children in this age group were not collected in previous years, so in order to ensure consistency from year to year, longitudinal comparisons were made using only belt use data. However, in keeping with the changes in the child restraint statutes, data were collected for additional age categories (4 through 5 years and 6 through 15 years) and for all types of restraint use.

As seen in Figure 8, 52% of children in the 0 through 5 age group in metropolitan areas used child safety or booster seats correctly, and 13.5% used them incorrectly, whereas less than 1% used seat belts correctly and 13.4% used them incorrectly. A portion of the percentage of incorrect use involving 27% of the 0 through 5 age group might be due to an inappropriate choice of restraint system. Although the 0 through 5 age restriction seems very clear-cut, the appropriateness of safety seat vs. safety belt use is also dependent on the child's size, a factor which is more open to interpretation. In the 4 through 5 age group (Figure 9), 24.5% used safety belts incorrectly, whereas only 3.7% used safety seats incorrectly. Since the child restraint laws leave the choice of restraint system to the adult driver and set no objective criteria other than age, drivers may be choosing inappropriately in some cases.



**Figure 8. 2002 Metropolitan Restraint Use Rates for 0 Through 5 and 6 Through 15 Year Olds**

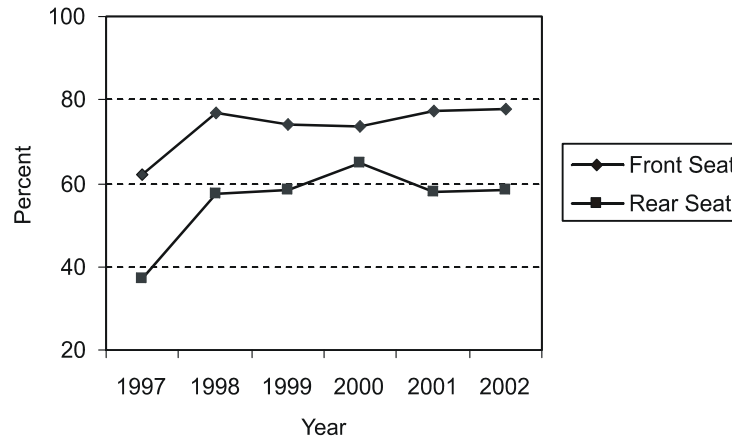


**Figure 9. 2002 Metropolitan Restraint Use Rates for 0 Through 3 and 4 Through 5 Year Olds**

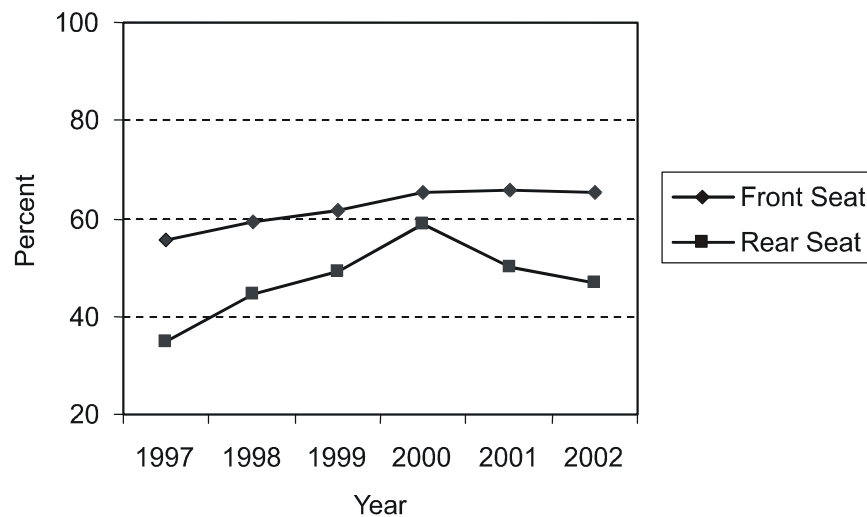
## Front vs. Rear Seat Belt Use

In 1997, changes in Sections 46.2-1094 and 46.2-1095 of the *Code* required that rear seat occupants aged 4 through 15 use safety restraints. Since this change became effective July 1, 1997, one would expect to see increases in rear seat restraint use not seen among front seat occupants beginning in 1997 and extending to 2002.

As seen in Figure 10, total metropolitan use rates for 4 through 15 year olds in the rear seats were consistently lower than for children in the front seats. Between 1997 and 2000, rear seat use rates increased as front seat rates declined or stayed the same. Thus, back seat use rates were beginning to “catch up” to front seat rates, perhaps because of the legislation’s influence. However, front seat use rates were still much higher than rates for rear seats, and the discrepancy between front and rear seat use increased in 2001 and was maintained in 2002. Front seat use is about 20 points higher than back seat use. A similar trend was noted with regard to correct use, with back seat rates coming within about 6 points of the front seat rate in 2000 (Figure 9). This discrepancy increased to almost 19 points in 2002.



**Figure 10. Total Safety Belt Use Rates for 4 Through 15 Year Olds in Metropolitan Areas: Front vs. Rear Seats (1997-2002)**



**Figure 11. Correct Safety Belt Use Rates for 4 Through 15 Year Olds in Metropolitan Areas: Front vs. Rear Seats (1997-2002)**

### Safety Belt Use by Occupants 4 Through 15 Years of Age in the Mid-Size Cities

As shown in Figure 12, total and correct safety belt use for occupants 4 through 15 years of age in mid-size cities rose from the low- to mid-30s in 1997 to 71.0% and 59.8%, respectively, by 2000. As was seen throughout the 2001 and 2002 data, total use then declined to 68.3% in 2001 and to 65.3% in 2002. The correct use declined in 2001 but rebounded in 2002 to 57.7%. As seen in Figure 13, total 2002 use rates varied from 42.6% in Danville (a drop of about 9 points) to 77.0% in Charlottesville (an increase of about 3 points). Correct use rates varied from 38.9% in Danville to 65.8% in Charlottesville.

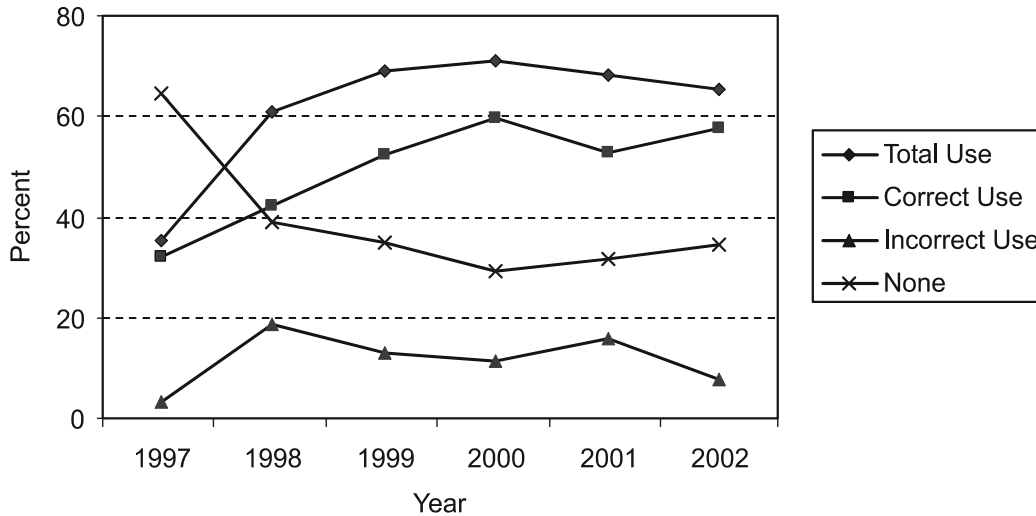


Figure 12. Safety Belt Use Rates for 4 Through 15 Year Olds in Mid-Size Cities (1997-2002)

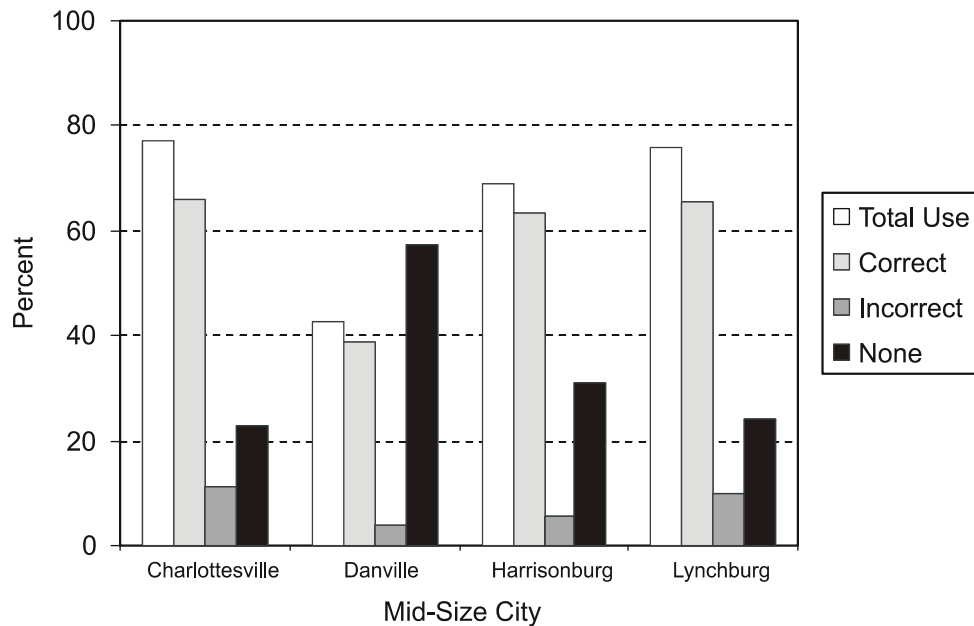
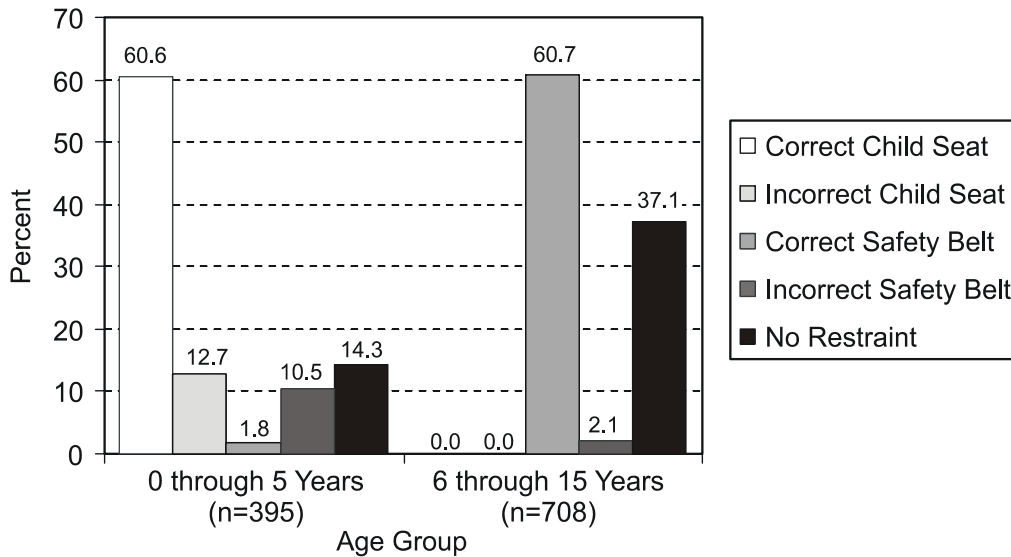


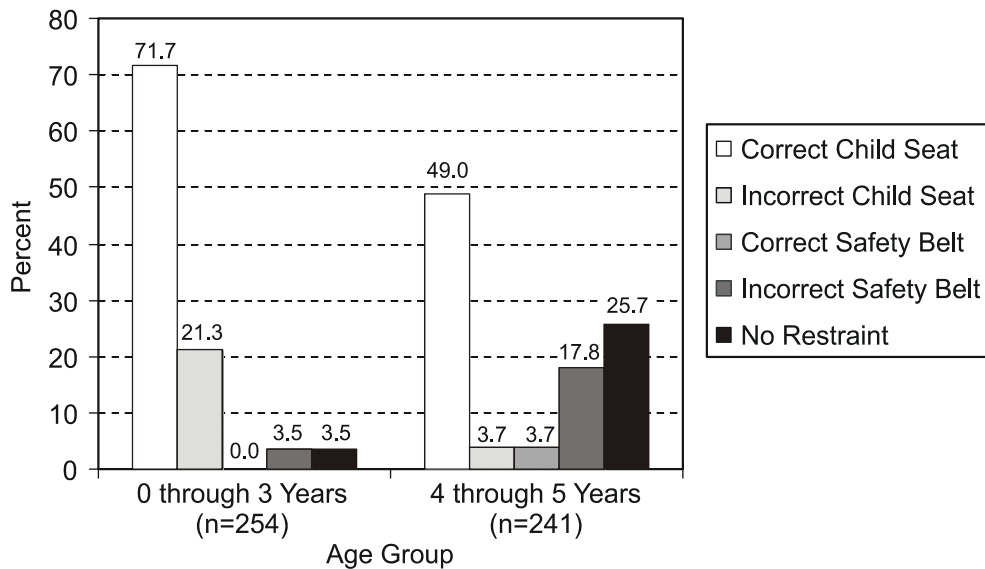
Figure 13. 2002 Safety Belt Use Rates for 4 Through 15 Year Olds in Mid-Size Cities

## Mid-Size City Restraint Use Among Children in Other Age Categories

Since the new legislation covering child restraint use requires that children up through age 5 use safety or booster seats, additional age categories were added to the data collection process to ensure that the impact of the new stipulations could be evaluated. These data for the four mid-size cities are presented in Figures 14 and 15.



**Figure 14. 2002 Mid-Size City Use Rates for 0 Through 5 Year Olds and 6 Through 15 Year Olds**

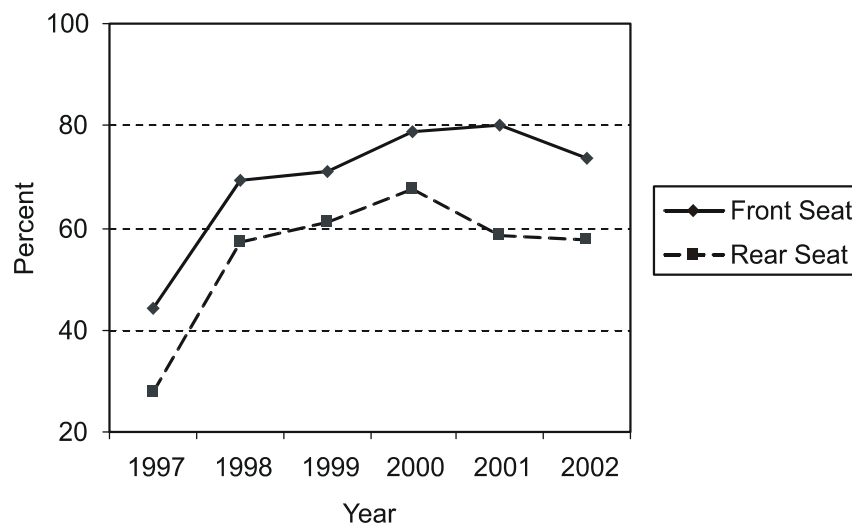


**Figure 15. 2002 Mid-Size City Use Rates for 4 Through 5 Year Olds and 6 Through 15 Year Olds in Mid-Size Cities**

In the 0 through 5 age group, 60.6% used safety/booster seats correctly and less than 2% used safety belts correctly. About 14% were unrestrained. In the mid-size cities, 115 of these children used restraints incorrectly, with 2.7% using safety seats inappropriately and 10.5% using safety belts incorrectly (Figure 14). About 45% of these children were in the 4 through 5 year old age group, where it is possible that at least a portion of the percentage of the incorrect use to be attributed to the difficulty in a driver deciding which restraint use was appropriate for the age, weight, and height of the child. As seen in Figure 15, 3.7% of the children age 4 through 5 years used child seats inappropriately and 17.8% used safety belts inappropriately. Although the recent amendment requiring all children 0 through 5 to be secured in a child restraint device seems clear-cut, the stipulation included in Section 45.2-1100—“the weight and size of the child is such as to make the use of such seat belt practical and the use of an approved child restraint impractical” leaves the choice of the appropriate restraint system open to interpretation, particularly in the 4 through 5 are group. In this case, parents and other drivers may need additional guidance to make the correct decision.

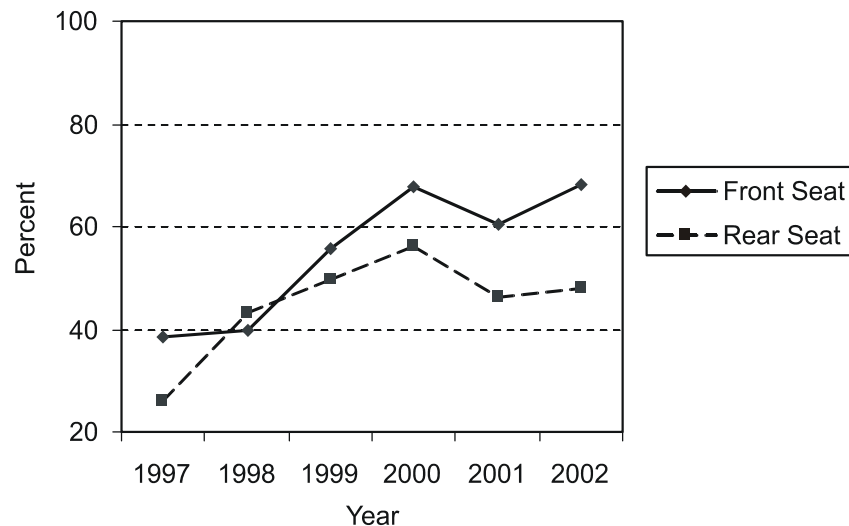
### Front vs. Rear Seat Belt Use

The total and correct safety belt use rates for the front and rear seat occupants in the mid-size cities are shown in Figure 16. As was the case in metropolitan areas, legislatively mandated rear seat belt use is consistently lower than front seat belt use among children aged 4 through 15. The closest these two figures came was in 1999, when total front seat use was 10.3 points higher. By 2001, total front seat use had risen to 80.1% but dropped in 2002 to 73.6%. Total rear seat use had dropped to 58.4% in 2001 and continued to drop in 2002 to 57.7%, creating a 16.9% difference. If the legislative changes applied to this age group had been effective, increases in rear seat use should have been substantial such that front and rear seat use would be similar.



**Figure 16. Total Safety Belt Use Rate for 4 Through 15 Year Olds in Mid-Size Cities: Front vs. Rear Seats (1997-2002)**

Quite a different pattern was seen in terms of correct restraint use among 4 through 15 year olds in mid-size cities. Although correct front and rear seat use rates were very low in 1997 (38.5% and 26.2%, respectively), correct rear seat use surpassed front seat use in 1998 (see Figure 17). Between 1998 and 2000, front seat usage rose faster than rear seat usage, and then both dropped precipitously in 2001, rebounding in 2002. Although both front and rear seat use rates were higher than corresponding 1997 rates, they were still relatively low, at 68.1% and 48.1%, respectively.



**Figure 17. 2002 Correct Safety Belt Use Rates for 4 Through 15 Year Olds in Mid-Size Cities: Front vs. Rear Seats (1997-2002)**

### MAJOR FINDINGS FOR 2002

The reader is again cautioned that this study comprised an in-traffic survey and the data are subject to only those use factors that could be verified from outside the vehicle. It is likely that the rates of correct child safety seat use are overestimated, especially when viewed in the context of other studies where observers were able to enter vehicles and check for a loose lap/shoulder belt, the one item found to be most frequently misused. In addition, the reader is alerted to the relatively small number of child safety seat observations, especially in the mid-size cities, and reminded that minor changes in the counts can result in large changes in percentages. In addition, the analysis of the 2002 child restraint and safety belt data included total use rates in an attempt to mitigate the effect of subjective judgment in assessing incorrect restraint use from year to year.

In 2002, total child safety seat use for metropolitan areas and mid-size cities combined was 93.2% and correct use was 70.8%. Total seat belt use among 4 through 15 year olds in metropolitan areas and mid-size cities combined was 65.6%, and correct use was 55.4%.

### **Child Safety Seat Use in Metropolitan Areas**

- In 1997, safety advocates began an effort to get parents to move their young children to the rear seat. In Virginia metropolitan areas, the proportion of children under age 4 seated in the front seat decreased from 19.6% in 1997 to 5.8% in 2002.
- All four metropolitan areas had a lower proportion of front seat occupants in 2002 than in 1997, with 2002 rates varying from 3.9% (northern) to 9.5% (central).
- In 2002, the total safety seat use rate in metropolitan areas for children under age 4 was 91.0%. This is not Virginia's highest safety seat use rate, which was 92.4%, but it is the highest rate since 1999. All four metropolitan areas had a total use rate of more than 90%.
- The correct use rate in metropolitan areas for 2002 was 68.4%, a 12-point drop from 2000 and a nearly 15-point drop from the 1999 high.

### **Child Safety Seat Use in Mid-Size Cities**

- In 2002, the proportion of children under 4 years of age seated in the front seat declined to 6.7% from the 2000 high of 21.9%. Lynchburg posted the lowest proportion of front seat occupants at 2.4%, and Danville posted the highest at 17.4%.
- Although total use rates for children under 4 in 2002 were the highest documented, at 96.3%, correct use increased slightly to 74.3% after a precipitous drop in 2001. Total safety seat use increased in all three mid-size cities surveyed in previous years, and Harrisonburg, a recent addition, posted a 100% use rate, as did Charlottesville. Danville had the lowest total use rate of 85.7%. Correct use rates varied from 81.2% in Charlottesville to 64.3% in Danville.
- Between 1997, when data collection in mid-size cities began, and 2002, total use increased from 58% to 96.3%, and correct use increased from 43.2% to 74.3%, an increase of 32 points.

### **Use of Safety Restraints by Occupants 4 Through 15 Years of Age in Metropolitan Areas**

- When the data for all four metropolitan areas were combined, about 33% of the 4 through 15 year olds observed were seated in the front seats. This represents a decline in front seat occupancy in this age group from 2001 (41.3%).
- In 2002, the total metropolitan use rate continued to decline, from 68.0% in 2000 to 66.0% in 2001 and 65.8% in 2002. Correct use followed the same pattern, bottoming out at 53.8%. Declines were noted in all areas except the western area, where total use increased almost 10 points. However, this increase represented a rebound from an almost 20-point decline between 2001 and 2002.



- Although improvements have been made in safety belt use among 4 through 15 year olds since 1997, recent declines indicate that additional efforts need to be aimed at guardians and children in this age group.

### **Use of Safety Restraints by Occupants 4 Through 15 Years of Age in Mid-Size Cities**

- When the data from mid-size cities were combined, 40.8% of 4 through 15 year old occupants were in the front seats. Although the percentage of front seat occupants in this age group declined in several of the annual surveys, there was less than a 5-point difference between the 1997 and 2002 figures.
- In 2002, total use rates in mid-size cities declined by 5.7 points from the 2000 high of 71.0% to 65.3%, and correct use declined by about 2 points to 57.7%.
- Between 1997 and 2002, total use for mid-size cities increased 30 points and correct use by just over 25 points, a substantial improvement. However, these figures are low compared to child safety seat use rates.

## **RECOMMENDATIONS**

1. *With the 2002 changes in the child restraint laws requiring safety or booster seat use for children under 6 years of age, parents, guardians, and other drivers transporting young children may need more guidance in determining when to move a child from a safety seat to a safety belt.* This is crucial since the 2002 amendments removed the specific height and weight criteria for safety seat vs. safety belt use (40 pounds or 40 inches) and simply state that 4 through 5 year olds will use a child or booster seat unless their weight or height make the use of an approved child restraint “impractical.” It is recommended that the Virginia Department of Health’s Office of Injury Prevention publicize such guidelines and perhaps require that they be posted in businesses selling child or booster seats.
2. *Since child seat and safety belt use rates are very low for 4 through 15 year olds, this group needs more attention.* The Virginia Department of Health in cooperation with the Virginia Department of Education should develop campaigns aimed specifically at the guardians of 4 through 5 year olds and both guardians of and children aged 6 through 15 years. For programs used in school to increase awareness among 6 through 15 year olds, emphasis should be placed on designing the materials and activities such that they meet the standards of learning for the state health and driver education curricula.
3. *The total use rate, rather than the correct use rate, should be the primary measure of compliance with the child safety restraint laws since incorrect use is too difficult to identify consistently from outside the vehicle.* Total use, which includes correct and incorrect use, is a more objective statistic.

4. *Once data for a sufficient number of years have been collected, the primary measurement of restraint use should focus on the 0 through 5 age group and the 6 through 15 age group to reflect the 2002 changes in the safety seat use laws.*

### **ACKNOWLEDGMENTS**

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