

FINAL REPORT

**URBAN SAFETY RESTRAINT USE BY INFANTS AND CHILDREN
UNDER 16 YEARS OF AGE IN VIRGINIA: THE 2003 SURVEY RESULTS**

**Cheryl W. Lynn
Senior Research Scientist**

**Jami L. Kennedy
Research Associate**

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

Charlottesville, Virginia

May 2004
VTRC 04-R23

DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Virginia Department of Transportation, the Commonwealth Transportation Board, or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

Copyright 2004 by the Commonwealth of Virginia.

ABSTRACT

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 children under age 16 use safety restraints. 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.”

Safety restraint use among children has been monitored in Virginia using roadside surveys since the early 1980s. Changes were made in the 2002 survey methodology to allow the survey to reflect the changes in the child restraint law. The age categories previously used in the survey were changed to (1) infants and toddlers 0 through 3 years of age, (2) preschoolers 4 and 5 years old, and (3) children 6 through 15 years old. These categories will allow investigators to continue to analyze the longitudinal restraint use data using the previous age categories (0 through 3 years and 4 through 15 years) and to evaluate the impact of the legislative changes in 2002 using the new age categories (0 through 5 years and 6 through 15 years) when sufficient data are available.

A total of 2,452 children were observed during the 2003 survey: 353 children under age 4 and 2,099 children 4 through 15 years of age. In 2003, total child restraint use for metropolitan areas and mid-size cities combined was 91.1% and correct use was 89.3%. Total seat belt use among 4 through 15 year olds in metropolitan areas and mid-size cities combined was 65.1%, and correct use was 53.5%.

FINAL REPORT

URBAN SAFETY RESTRAINT USE BY INFANTS AND CHILDREN UNDER 16 YEARS OF AGE IN VIRGINIA: THE 2003 SURVEY RESULTS

Cheryl W. Lynn
Senior Research Scientist

Jami L. Kennedy
Research Associate

INTRODUCTION

The Virginia Transportation Research Council has been tracking the use of child safety restraint systems for Virginia since 1983. Child restraint 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 restraint program to the Virginia Department of Health in 1997, that agency requested that the surveys be continued.

Because the sites used in the survey were not selected randomly, 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 provide safety program administrators and public health officials an indication of changes in use rates over time and identify low use groups that can be targeted in future restraint use programs.

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 children under age 16 use safety restraints. In 2002, the legislature amended Section 46.2-1095 so that "[a]ny 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 "[t]he 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 Virginia Department of Health can evaluate previous efforts to increase restraint use and develop new programs for target audiences.

METHODS

The 2003 child restraint 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 three mid-size cities and the addition of Harrisonburg as the fourth mid-size city. The resulting increases in sample size allow more reliable and valid estimates of child restraint use. The reader should keep in mind that these sites were not selected randomly; rather, they were selected to maximize the probability of observing children in motor vehicles. Thus, high-volume intersections in each metropolitan area and mid-size city were targeted for inclusion in the sample. For this reason, the figures cited in this report do not represent the total population of children in Virginia.

Data were collected on occupants of 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 team member observed up to 15 vehicles per traffic light cycle. The safety of the observer (staying clear of entrances to businesses) and the volume of traffic determined the number of vehicles surveyed. At some intersections, it was possible to observe only five vehicles because of the signal timing or vehicle volume at the site. In addition, because of the increasing use of window tinting, especially on sport utility vehicles and minivans, in 87 instances, it was impossible to determine whether the children were using safety restraints. In those cases, front seat observations were included in the survey and rear seat observations were not.

As required by state policy, each team member wore a hard hat and an orange safety vest. Data were collected during 1-hour periods between 7:30 and 4:00 P.M. Two persons comprised 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 2003 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 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; explained the survey; and asked for the actual age, height, 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 consistently to identify the age group correctly independently of the other observers and until all the data collectors agreed on the age group. During the 2003 survey, this portion of the data collector training took approximately 8 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, as the law makes no such distinction (see Figure 1 for the data collection form used in 2003).

In this survey, safety belt and child safety seat use were broken into three categories for purposes of analysis: correct use, incorrect use, and nonuse. Correct use and nonuse were easy to identify consistently. Incorrect use, although defined the same way every year, was more difficult to determine consistently, since data collectors had to make these determinations from outside the vehicle. Conditions under which observers made the incorrect use determination differed with regard to the time 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, the definitions of *correct use* and *incorrect use* for child safety seats were changed in 2003 to measures that could be consistently determined from outside the vehicle. *Incorrect use* for children under 6 years of age was defined to include safety seat or lap belt use by a child either too large or too small for that form of restraint. For children 6 through 15 years of age, the definition of *incorrect use* was not changed. The definition used in previous years continued to be applied—using safety seats that were too small for the child or using a lap belt without the shoulder harness (most commonly with the shoulder belt passing behind the child's back). In addition, total use rates defined as *correct plus incorrect use* are presented to represent a rate not biased by any remaining variability in the incorrect use category.

CHILD SAFETY SEAT SURVEY

Summer 2003

Area _____ Site _____ @ _____ Sheet # _____

Diagram 1: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 2: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 3: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 4: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 5: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 6: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 7: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 8: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 9: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes 'Back Seats Not Visible' checkbox.

Diagram 10: Front seats (I PS Child, I PS Child) and back seats (I PS Child, I PS Child, I PS Child). Includes '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 those conducted in previous years in that it focuses on children under 4 years of age and children 4 through 15 years of age. The emphasis was continued in the 2003 survey report, since the data for the new age categories had not been collected long enough to use to determine the effectiveness of the 2002 legislative changes. The 2004 report will focus on children under 6 years of age and children 6 through 15 years of age to reflect the new child restraint requirements.

During the 2003 survey, 353 children under age 4 and 2,099 children 4 through 15 years of age were observed (Table 1). In 2003, the percentage of children under age 4 seated in the front seat continued to decrease in the metropolitan areas. However, in two mid-size-cities, Lynchburg and Harrisonburg, the percentage increased. In Lynchburg, the increase was small and the rate was still lower than the pre-2002 levels, whereas in Harrisonburg, the increase was more dramatic (to 16.7%). Since this was only the second year in which Harrisonburg was included in the sample, this increase may not reflect a trend. In both metropolitan areas and mid-size cities, about 40% of children aged 4 through 15 were seated in the front seat.

In 2003, total child restraint use among children under 4 years of age for metropolitan areas and mid-size cities combined was 91.1% and correct use was 89.3%. Total seat belt use among 4 through 15 year olds in metropolitan areas and mid-size cities combined was 65.1%, and correct use was 53.5%. These use rates were calculated by combining the observations for metropolitan areas and mid-size cities, and thus weighting each observation the same, even though observations in mid-size cities accounted for a higher proportion of the population than did the metropolitan observations.

Child Restraint Use in Metropolitan Areas

As seen in Figure 2, total and correct restraint use rates for children under age 4 in metropolitan areas followed a similar pattern between 1993 and 1999, but in 2001 and 2002, correct use dropped to 69.5% and 68.4%, respectively, whereas total use continued to increase. As in previous years, almost all of the drop in the correct use rates was accounted for by a 13% increase in incorrect use. This together with the fact that the level of incorrect use has varied from 0 to 20% over the years without any trends appearing, indicates that much of the variation in correct use may be the result of random or data collection variation. In 2003, the definition for incorrect use among children under 4 years of age was changed to remove the characteristics of incorrect restraint use that were subjective or difficult to identify consistently. The resulting definition was restricted to the use of a child restraint device inappropriate to the child's age, height, or weight.

In 2003, 6.3% of children under age 4 were using inappropriate safety restraints. Only 1 child under 4 years of age was using a child safety seat that was inappropriate to for the age, height, or weight. However, an additional 11 children under age 4 were observed using lap belts inappropriately. As seen in Figure 3, the highest level of incorrect use occurred in the central area, which also had the lowest use rate in the state.

**Table 1. Sample Sizes for Infants Under 4 Years Old for the 1997 through 2003 Surveys
by Area and Seat Location**

Area/Seat Location	Infants													
	1997		1998		1999		2000		2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Metropolitan Area														
Northern	151		128		133		60		160		152		77	
Front	26	17.2	3	2.3	8	6	7	11.7	7	4.3	6	3.9	2	2.6
Rear	125	82.8	125	97.7	125	94	53	88.3	153	95.7	146	96.1	75	97.4
Eastern	213		148		109		59		140		106		46	
Front	39	18.3	16	10.8	10	9.2	9	15.3	8	5.7	7	6.6	2	4.3
Rear	174	81.7	132	89.2	99	90.8	50	84.7	132	94.3	99	93.4	44	95.7
Central	92		69		71		68		76		63		42	
Front	22	23.9	5	7.2	2	2.8	4	5.9	4	5.3	6	9.5	4	9.5
Rear	70	76.1	64	92.8	69	97.2	64	94.1	72	94.7	57	90.5	38	90.5
Western	28		41		33		28		41		40		26	
Front	8	28.6	4	9.8	3	9.1	6	21.4	4	9.8	2	5	1	3.8
Rear	20	71.4	37	90.2	30	90.9	22	78.6	37	90.2	38	95	25	96.2
Total Metro	484		386		46		215		417		361		191	
Front	95	19.6	28	7.3	23	6.6	26	12.1	23	5.5	21	5.8	9	4.7
Rear	389	80.4	358	92.7	323	93.4	189	87.9	394	94.5	340	94.2	182	95.3
Mid-Size Cities														
Danville	21		20		34		15		27		46		36	
Front	4	19	4	20	7	20.6	6	40	3	11.1	8	17.4	2	5.6
Rear	17	81	16	80	27	79.4	9	60	24	88.9	38	82.6	34	94.4
Charlottesville	29		47		52		24		41		85		41	
Front	3	10.3	7	14.9	1	1.9	1	4.2	2	4.9	6	7.1	1	2.4
Rear	26	89.7	40	85.1	51	98.1	23	95.8	39	95.1	79	92.9	40	97.6
Lynchburg	31		19		37		25		40		82		55	
Front	5	16.1	2	10.5	3	8.1	7	28	6	15	2	2.4	3	5.5
Rear	26	83.9	17	89.5	34	91.9	18	72	34	85	80	97.6	52	94.5
Harrisonburg											41		30	
Front											1	2.4	5	16.7
Rear											40	97.6	25	83.3
Total Mid-Size	81		86		123		64		108		254		162	
Front	12	14.8	13	15.1	11	8.9	14	21.9	11	10.2	17	6.7	11	6.8
Rear	69	85.2	73	84.9	12	91.1	50	78.1	97	89.8	237	93.3	151	93.2

**Table 1 (continued). Sample Sizes for 4 through 15 Year Olds for the 1997 through 2003 Surveys
by Area and Seat Location**

Area/Seat Location	4 Through 15 Years													
	1997		1998		1999		2000		2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Metropolitan Area														
Northern	459		342		367		177		360		459		436	
Front	212	46.2	83	24.3	121	33	47	26.6	131	36.4	133	29	142	32.6
Eastern	694		442		328		152		351		372		368	
Front	336	48.4	114	25.8	113	34.5	49	32.2	153	43.6	154	41.4	160	43.5
Rear	358	51.6	298	67.4	215	65.5	103	67.8	198	56.4	218	58.6	208	56.5
Central	297		224		229		297		214		313		297	
Front	145	48.8	77	34.4	81	35.4	138	46.5	98	45.8	93	29.7	135	45.5
Rear	152	51.2	147	65.6	148	64.6	159	53.5	116	54.2	220	70.3	162	54.5
Western	143		98		102		72		133		136		104	
Front	68	47.6	36	36.7	44	43.1	27	37.5	55	41.4	50	36.8	55	52.9
Rear	75	52.4	62	63.3	58	56.9	45	62.5	78	58.6	86	63.2	49	47.1
Total Metro	1593		1106		1026		698		1058		1280		1205	
Front	761	47.8	340	30.7	359	35	261	37.4	437	41.3	430	33.6	492	40.8
Rear	832	52.2	766	69.3	667	65	437	62.6	621	58.7	850	66.4	713	59.2
Mid-Size Cities														
Danville	98		77		70		41		67		259		222	
Front	42	42.9	18	23.4	30	42.9	7	17.1	28	41.8	109	42.1	97	43.7
Rear	56	57.1	59	76.6	40	57.1	34	82.9	39	58.2	150	57.9	125	56.3
Charlottesvl.	152		114		94		82		90		196		188	
Front	72	47.4	30	26.3	39	41.5	33	40.2	43	47.8	67	34.2	65	34.6
Rear	80	52.6	84	73.7	55	58.5	49	59.8	47	52.2	129	65.8	123	65.4
Lynchburg	135		98		83		56		130		327		324	
Front	65	48.1	37	37.8	35	42.2	16	28.6	60	46.2	128	39.1	138	42.6
Rear	70	51.9	61	62.2	48	57.8	40	71.4	70	53.8	199	60.9	186	57.4
Harrisonburg											167		160	
Front											83	49.7	79	49.4
Rear											84	50.3	81	50.6
Total Mid-Size	385		289		247		179		287		949		894	
Front	179	46.5	85	29.4	104	42.1	56	31.3	131	45.6	387	40.8	379	42.4
Rear	206	53.5	204	70.6	143	57.9	123	68.7	156	54.4	562	59.2	515	57.6

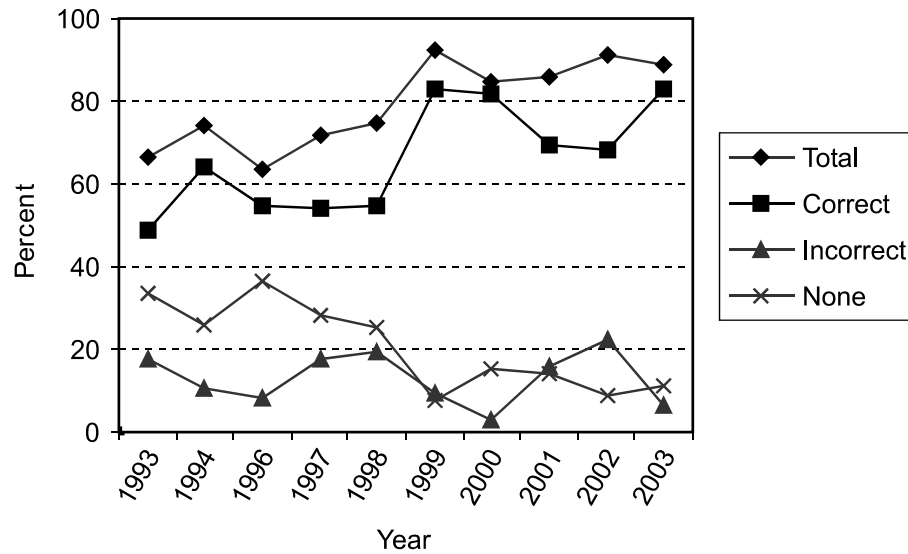


Figure 2. Child Restraint Use Rates for Children Under Age 4 in All Metropolitan Areas (1993-2003)

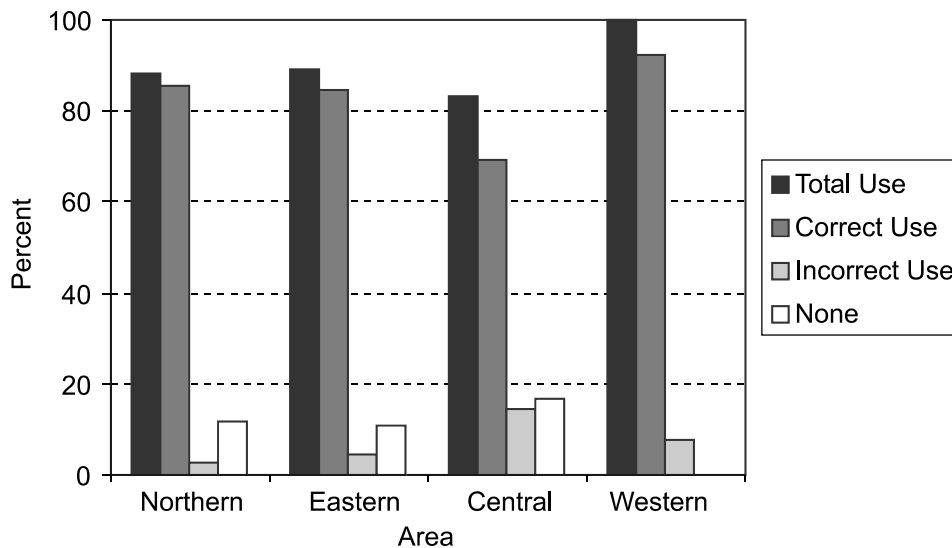


Figure 3. 2003 Restraint Use Rates for Children Under Age 4 by Metropolitan Area

Child Restraint Use in Mid-Size Cities

Child restraint use rates among children under 4 years in mid-size cities followed a pattern similar to that for metropolitan areas (Figure 4). By 1999 and 2000, total use had increased and correct use had decreased, with variations in correct and incorrect use generally canceling each other out. In 2003, total use rates for all mid-size cities remained high at 94.4%, down slightly from the 2002 high of 96.3%. Correct use increased from 73.1% and 74.3% in 2001 and 2002, respectively, to 88.9% in 2003, in part because of the redefinition of the incorrect use category for children under age 4. Of the 9 children under age 4 who were wearing child

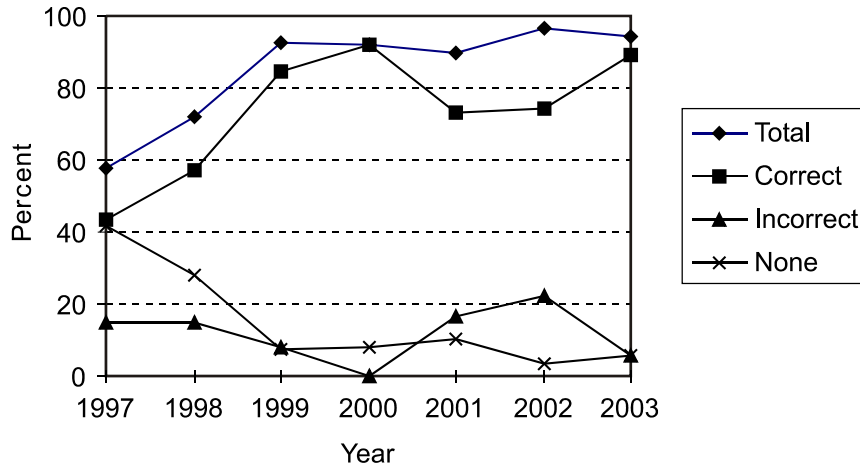


Figure 4. Child Restraint Use Rates for Children Under Age 4 for All Mid-Size Cities (1997-2003)

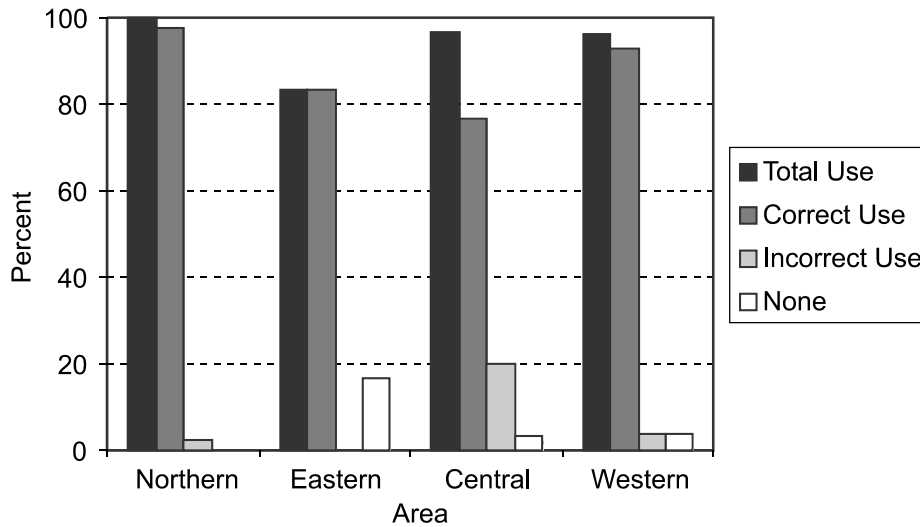


Figure 5. 2003 Child Restraint Use Rates for Children Under Age 4 by Mid-Size City

restraints inappropriately, 5 were using child seats inappropriately, and 4 were using safety belts inappropriately.

As seen in Figure 5, 2003 total use rates were 100% in Charlottesville for the second year in a row. Danville had the lowest *total* use rate (83.3%). Harrisonburg had the lowest *correct use* rate (76.7%), largely due to its high level of incorrect use. Of the 20% of children in the incorrect use category, 4 were using safety seats inappropriately and 2 were using safety belts inappropriately. However, these results are based on relatively small sample sizes.

Restraint Use Among 4 Through 15 Year Olds in Metropolitan Areas

For occupants 4 through 15 years of age, total restraint use rates in the metropolitan areas of the state increased from 49.2% in 1997 to 68.0% in 2000 but fell to 62.8% in 2003 (Figure 6). Correct use in all metropolitan areas combined peaked in 2000 at 61.3% but fell to 52.9% by 2003. Incorrect use was 9.9% and occurred among safety belt users only. As seen in Figure 7, in 2003, total and correct seat belt use rates were highest in the western area of the state and lowest in the central area for the second year in a row, a decided change from previous years. Total use fell in the central area from 65% in 2001 to 58.6% in 2003, and total use increased in the western area from 60.9% in 2001 to 71.2% in 2003.

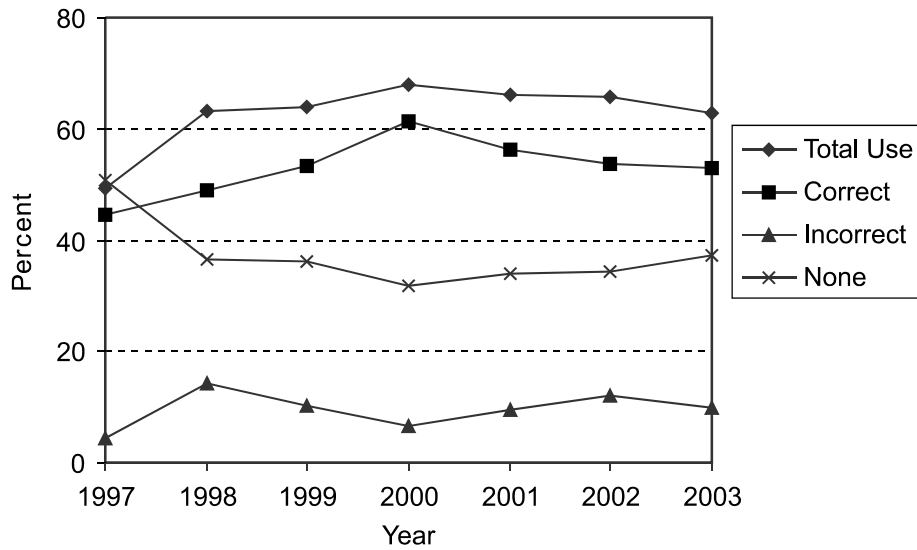


Figure 6. Restraint Use Rates for 4 through 15 Year Olds in Metropolitan Areas (1997-2003)

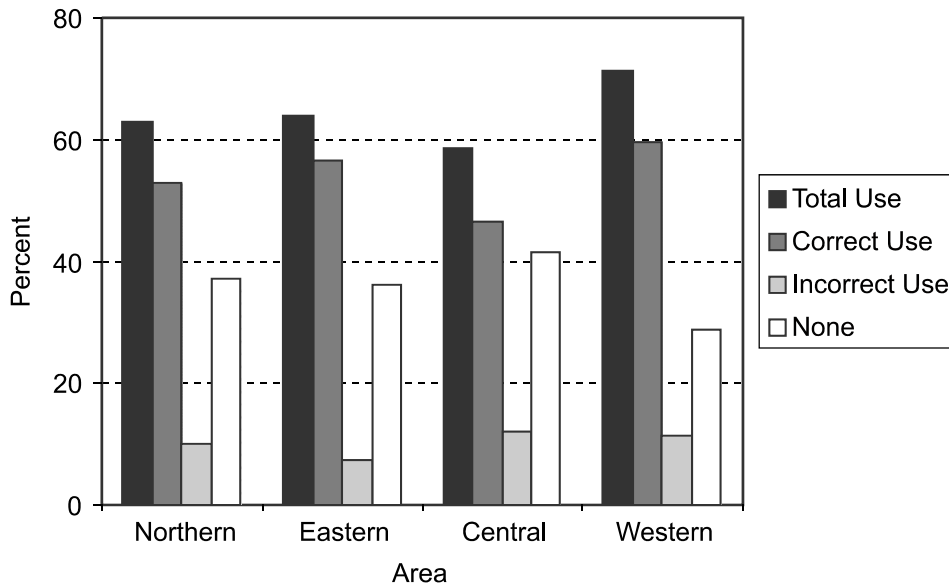


Figure 7. 2003 Restraint Use Rates for 4 Through 15 Year Olds by Metropolitan Area

Front vs. Rear Restraint 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 2003.

As seen in Figure 8, 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, with back seat use rates starting to “catch up” to front seat rates. 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 2002 when front seat use was about 20 points higher than back seat use. Although both front and rear seat use declined in 2003, the discrepancy between the use rates decreased to about 16 points.

A similar trend was noted with regard to correct use: back seat rates came within about 6 points of the front seat rate in 2000 (Figure 9). This discrepancy increased to almost 19 points in 2002 and declined to about 16 points in 2003.

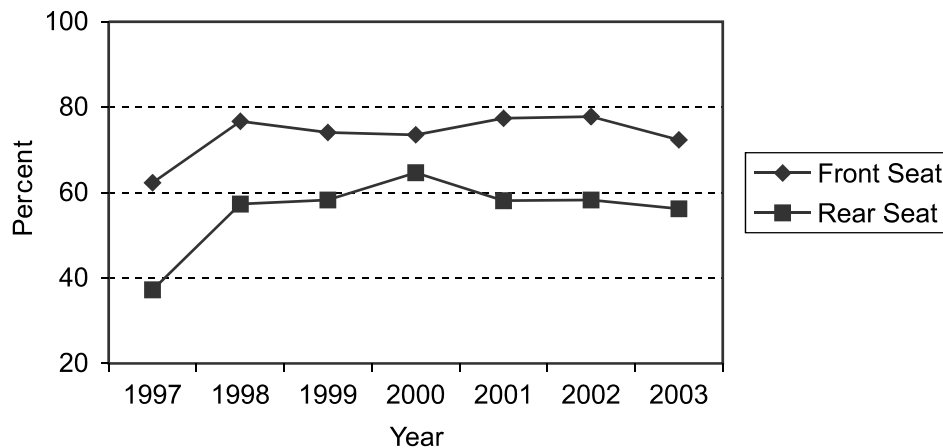


Figure 8. Total Restraint Use Rates for 4 through 15 Year Olds in Metropolitan Areas: Front vs. Rear Seats (1997-2003)

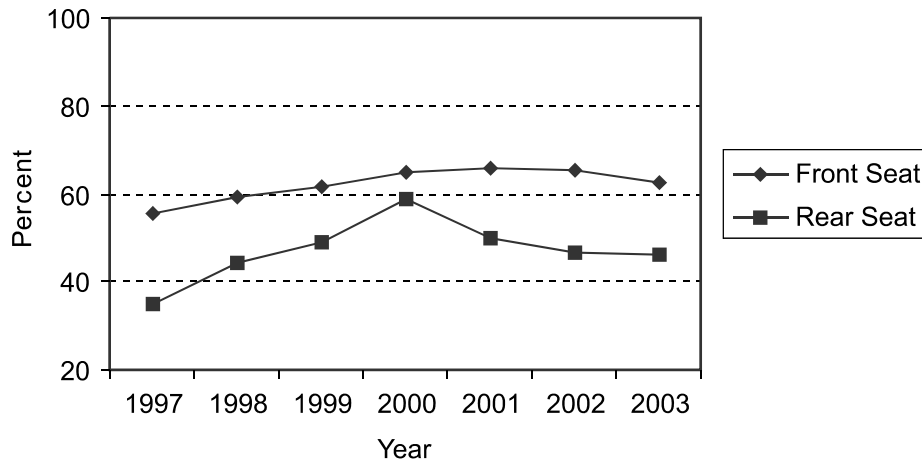


Figure 9. Correct Restraint Use Rates for 4 through 15 Year Olds in Metropolitan Areas: Front vs. Rear Seats (1997-2003)

Restraint 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 35.3% and 31.9%, respectively, in 1997 to highs of 71.0% and 59.8%, respectively, in 2000. Both declined to new lows in 2001. Total use declined gradually to 65.3% in 2003, whereas correct use plummeted to 52.6% and then recovered to 55.9% by 2003. Incorrect use rose slightly from 7.1% in 2002 to 9.4% in 2003. All incorrect use was observed among safety belt users (Figure 10).

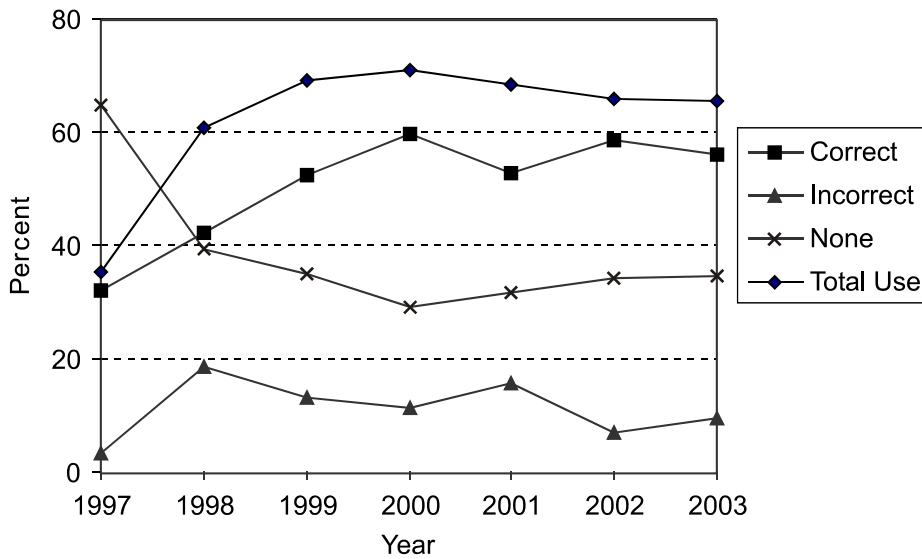


Figure 10. Restraint Use Rates for 4 through 15 Year Olds in Mid-Size Cities (1997-2003)

As seen in Figure 11, the total 2003 use rates varied from 52.3% in Danville to 76.1% in Charlottesville, with correct use rates following a similar pattern. Incorrect use was highest in Harrisonburg at 15.6% and lowest in Danville at 7.2%. Interestingly, Harrisonburg had the highest incorrect use rates for both children under 4 years and children 4 through 15 years old.

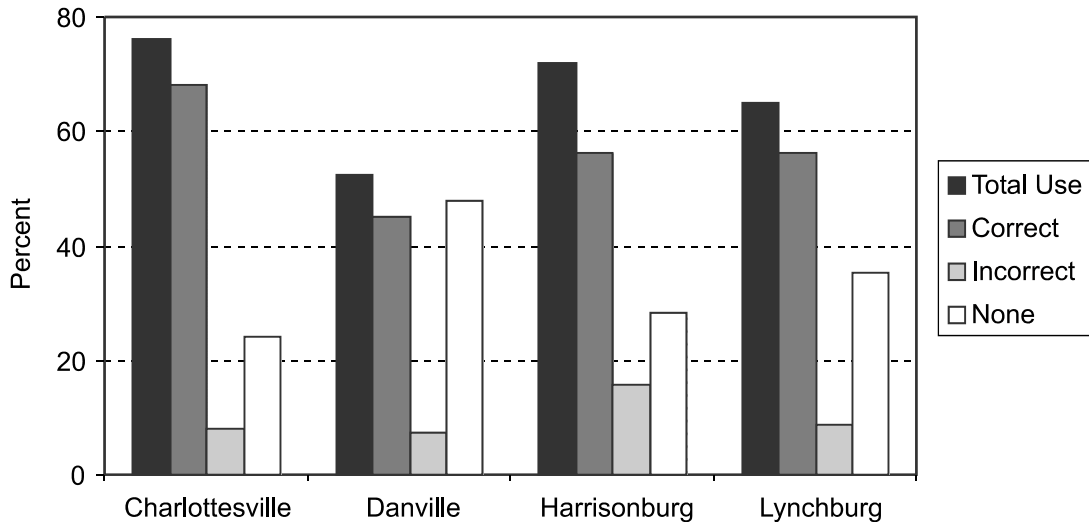


Figure 11. 2003 Restraint Use Rates for 4 Through 15 Year Olds by Mid-Size City

Front vs. Rear Restraint Use

The total and correct restraint use rates for the front and rear seat occupants in the mid-size cities are shown in Figures 12 and 13, respectively. As was the case in metropolitan areas, legislatively mandated rear seat belt use was consistently lower than front seat belt use among

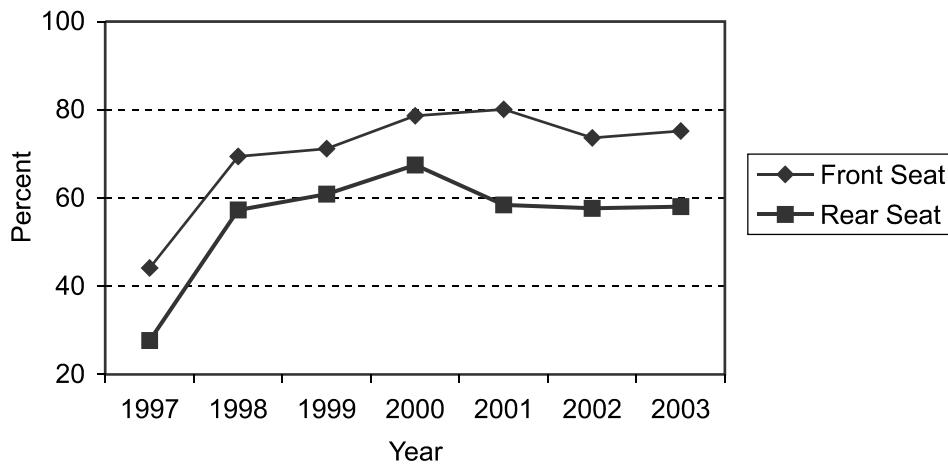


Figure 12. Total Restraint Use Rate for 4 Through 15 Year Olds in Mid-Size Cities: Front vs. Rear Seats (1997-2003)

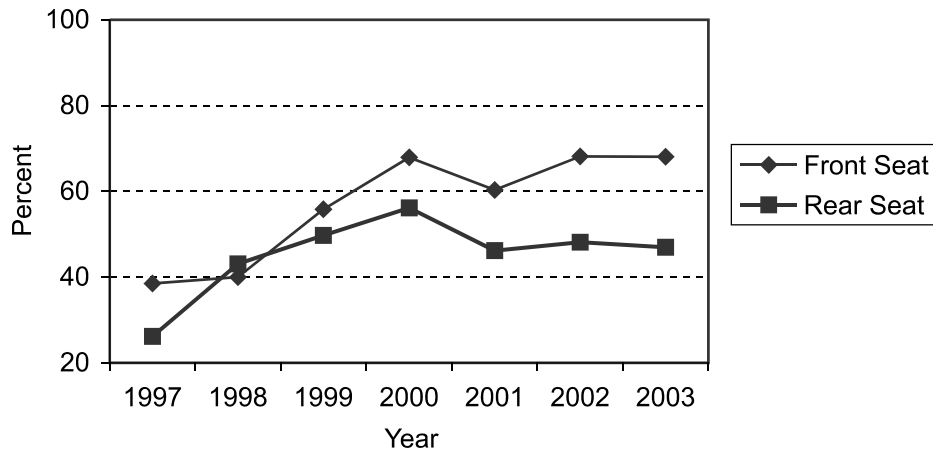


Figure 13. 2002 Correct Restraint Use Rates for 4 Through 15 Year Olds in Mid-Size Cities: Front vs. Rear Seats (1997-2003)

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. In 2003, the difference between front and rear seat use rose to a high of 17.1%. 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 rates would be similar.

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 13). Between 1998 and 2000, front seat usage rose faster than rear seat usage, and then both dropped precipitously in 2001. By 2003 the difference in front and rear-seat use rates was more than 21 points, an all-time high.

MAJOR FINDINGS FOR 2003

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 in which observers were able to enter vehicles and check for a loose lap/shoulder belt, the one item found to be most frequently misused. Also, because of the increasing use of window tinting, especially on SUVs and minivans, the restraint use of a number of children seated in the rear of the vehicle could not be determined. In addition, the reader is alerted to the relatively small number of child restraint observations, especially in the mid-size cities, and reminded that minor changes in the counts can result in large changes in percentages.

In 2003, total child restraint use for metropolitan areas and mid-size cities combined was 91.1% and correct use was 89.3%. Total seat belt use among 4 through 15 year olds in metropolitan areas and mid-size cities combined was 65.1% and correct use was 53.5%.

Safety Restraint Use by Occupants Under Age 4

In Metropolitan Areas

- In 1997, safety advocates began an effort to get parents or guardians to move young children to the rear seat. In Virginia's metropolitan areas, the proportion of children under age 4 seated in the front seat decreased from 19.6% in 1997 to 4.7% in 2003.
- All four metropolitan areas had a lower proportion of front seat occupants in 2003 than in 1997, with 2003 rates varying from 2.6% (northern) to 9.5% (central).
- In 2003, the total restraint use rate in metropolitan areas for children under age 4 was 88.3%. This is not Virginia's highest restraint use rate, which was 92.4% in 1999.
- The correct use rate in metropolitan areas for 2003 was 87.8%. This increase may have been due in part to changes made in the definition of *incorrect use* for children under age 4.

In Mid-Size Cities

- In 2003, the proportion of children under 4 years of age seated in the front seat was 6.8%, virtually the same as in 2002 (6.7%). Charlottesville had the lowest proportion of front seat occupants at 2.4%, and Harrisonburg had the highest at 16.7%.
- In 2003, the total use rates for children under age 4 declined from the 2002 high of 96.3% to 94.3% but were still higher than in previous years. Correct use increased to 91.1% in 2003 after a precipitous drop in 2001 and 2002. Part of this increase may have been due to the redefinition of *incorrect use* for children under age 4.
- Total restraint use exceeded 90% in all mid-size cities except Danville, which had a total use rate of 83.3%.

Safety Restraint Use by Occupants 4 Through 15 Years of Age

In Metropolitan Areas

- When the data for the four metropolitan areas were combined, 40.8% of the 4 through 15 year olds occupants were in the front seats.

- In 2003, the total metropolitan use rate continued to decline, from 68.0% in 2000 to 62.8%. Correct use followed the same pattern, bottoming out at 52.9%.

In Mid-Size Cities

- When the data from mid-size cities were combined, 42.4% of 4 through 15 year old occupants were in the front seats.
- In 2003, total use rates in mid-size cities declined slightly and the correct use rate fell by about 3 points to 55.9%.
- Between 1997 and 2003, total use for mid-size cities increased 30 points and correct use increased by just over 24 points, a substantial improvement. However, these figures are low compared to child restraint use rates and are the lowest in recent years.

RECOMMENDATIONS

1. *Since child seat and safety belt use rates are very low for 4 through 15 year olds and since these rates are on the decline, 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 parents and guardians of 4 through 5 year olds and the parents and guardians of 6 through 15 year olds.
2. *Children 4 through 15 years of age should be targeted for educational, hands-on activities that demonstrate the need for safety belt use.* Although these activities could be incorporated into the health curriculum, they could also be used to satisfy the standards of learning for intermediate and high school science curricula, especially with regard to the laws of motion and conservation of energy. A number of these educational activities are available for purchase “off-the-shelf,” but these demonstrations can also be done using materials generally available in the classroom. Some activities of this type are available from the American Association of State Highway and Transportation Officials in its Transportation and Civil Engineering Program (TRAC), a set of materials designed to introduce transportation issues to intermediate and high school students. Information on TRAC may be found at <http://www.transportation.org/programs/trac/site.nsf/HomePage/Overview?opendocument>. State departments of transportation that participate in the TRAC program, such as the Virginia Department of Transportation, have access to demonstration copies of the activities, which can be lent to other state agencies and schools. In addition, a number of audiovisual materials showing crash tests and the effectiveness of safety restraints are available from safety agencies and organizations such as the National Highway Traffic Safety Administration and the Insurance Institute for Highway Safety.
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 restraint use laws.*

ACKNOWLEDGMENTS

The authors express their sincere appreciation to Brian Cox and Darleen Miller for the many hours they spent traveling around the state to collect the data used in this report and later in assisting in the data entry and analysis. Thanks also go to Ann McDaniel, who prepared the report; Randy Combs, who prepared the figures; and Linda Evans, who edited the report.