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Evaluation of the Effects of Educational and Legislative Activities on Child Passenger Safety in North Carolina

1981 - 1989

William L. Hall

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EVALUATION OF THE EFFECTS OF EDUCATIONAL AND LEGISLATIVE ACTIVITIES ON CHILD PASSENGER SAFETY IN NORTH CAROLINA 1981 - 1989

Prepared by:

William L. Hall

The University of North Carolina
Highway Safety Research Center
Chapel Hill, NC

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This report has been extracted from a full project report prepared for the NC Governor's Highway Safety Program entitled "Comprehensive Program for Increasing Use of Safety Seats and Seat Belts for Children and Young Adults: Final Report 1989" (HSRC - PR 164). This full report summarizes a year of activities aimed at reducing occupant casualties among our state's infants, children and youth.

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The North Carolina Governor's Highway Safety Program (GHSP) has been funding the University of North Carolina Highway Safety Research Center (HSRC) to conduct activities designed to convince parents to buckle up their children in cars since 1978. This was done due to the large number of children who were being killed or seriously injured in car crashes due to the non-use of restraint systems. In 1977, HSRC began a child passenger safety education program. With the financial support of the Governor's Highway Safety Program, HSRC has continued and expanded its efforts and goals to increase the proper use of safety seats and belts for children and young adults through a wide diversity of programs and activities. In 1981, legislation mandating the use of restraint systems for children was enacted and later expanded in 1985. Due in part to the results of this legislation, the use of safety belts for drivers and front seat occupants was also mandated by the NC Legislature in 1985. Throughout the years, statewide public information and education programs were conducted targeting many different audiences, teaching and training of health and safety professionals was routinely provided, and safety seat rental programs were established throughout the state.

Now there is a widespread network of individuals and organizations across the state who consider child passenger safety to be a primary concern and conduct various educational and promotional activities in their own communities. Occupant protection has become an integral part of educational messages and services provided by health professionals. Law enforcement officers serve as role models and educators as well as enforcing the occupant protection laws. The use of safety seats and belts is now the norm rather than the exception. Safety seat and belt usage rates for children in accidents have increased dramatically and fatal and serious injury rates have declined.

This report is an evaluation of the effects of North Carolina occupant protection legislation and educational activities on safety seat and seat belt usage rates for children and youth and associated injury reduction in the state. Analyses are conducted on three sources of data: North Carolina accident data, data obtained through observational surveys, and data obtained through mail-back questionnaires associated with the observational surveys. Table 1 presents an overview of the restraint and fatality status of children involved in North Carolina car crashes during the past 15 years.

As was previously mentioned, educational efforts were begun in 1978 to attempt to convince parents to use safety seats and belts for their children in cars. Beginning in 1979 there was a slow but steady increase in the percentage of children who were reported to be buckled up in crashes. In July, 1982, the first Child Passenger Safety Law went into effect requiring parents to restrain their children under age two. Larger increases in reported restraint usage rates were seen beginning in 1982. In July, 1985, this law was expanded to require all drivers to buckle up all

Table 1. Police Reported Restraint Usage and Fatalities for All 0-5 Year Old Occupants in North Carolina Crashes.

Year	% Restrained	# Killed	# Unrestrained	# Restrained
1974	5.4	28	28	0
1975	5.0	29	29	0
1976	4.6	26	26	0
1977	5.9	28	28	0
1978	4.7	36	36	0
1979	7.0	24	24	0
1980	10.5	18	18	0
1981	11.0	22	21	1
1982	17.4	17	16	1
1983	25.1	21	19	2
1984	34.4	20	17	3
1985	61.8	23	20	3
1986	75.7	25	18	7
1987	86.2	21	17	4
1988	86.4	39	28	11

children less than age six. As would be expected, this legislative activity was associated with the largest increase in usage rates.

The fatality figures in Table 1 show two reasons for concern. First and foremost, the 39 children killed during 1988 was the largest number of any year and this was with the reported usage rate of 86 percent. The reasons for this large increase are not clear, but several aspects will be explored during further analyses. It is clear, however, that the vast majority of these children who were killed were not restrained at the time of the crash. The second area of concern is the increase, from one in 1981 to eleven in 1988, in the number of children who were killed while restrained. Primarily, this concern is related to the potential for negative publicity that could have an adverse effect on continued educational efforts. In reality, it should be the goal of any safety seat or seat belt educational program to see that all occupant fatalities are restrained at the time of the crash. This goal acknowledges the fact that there are going to be crashes that are so severe that they cannot be survived regardless of restraint status. Thus, if all vehicle occupants are properly restrained, all persons killed will be restrained and fatalities will have been reduced to the greatest extent possible.

As shown in Figure 1, the reported restraint usage rate for children less than two (covered by the initial law) has increased from 28 percent in the year prior to the law to 91 percent July 1988 through June 1989. While the usage rate for 2-5 year olds also increased substantially (from 8% to 85%) since 1982, the largest increase came after the expanded law went into effect in 1985. Note that the same trend holds true for the 6-15 year olds. These children became covered under the NC Seat Belt Law in October 1985 if riding in the front seat. Reported restraint usage rates for

Figure 1. Police Reported Restraint Usage Rates for Accident Involved Children, January, 1981 through June, 1989

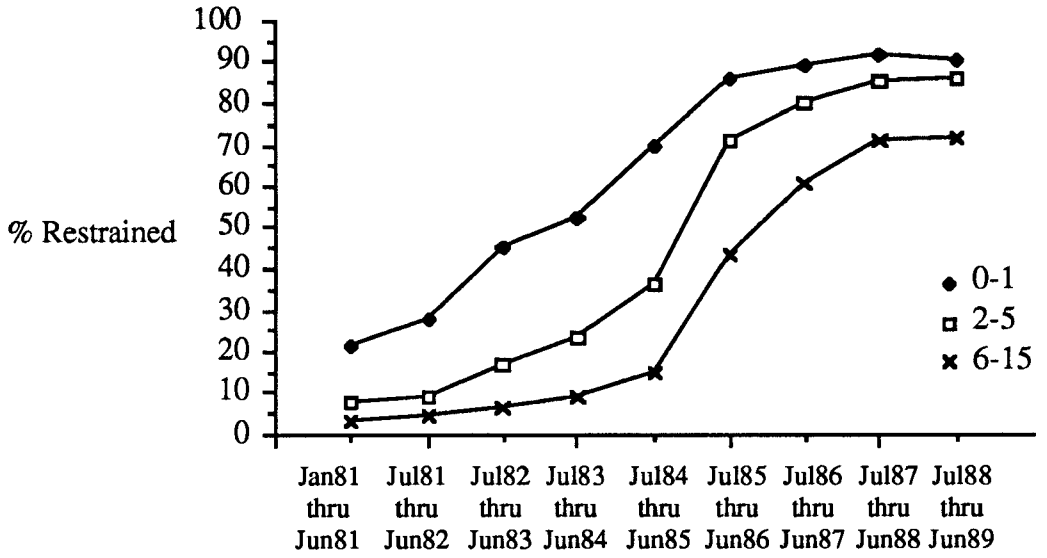
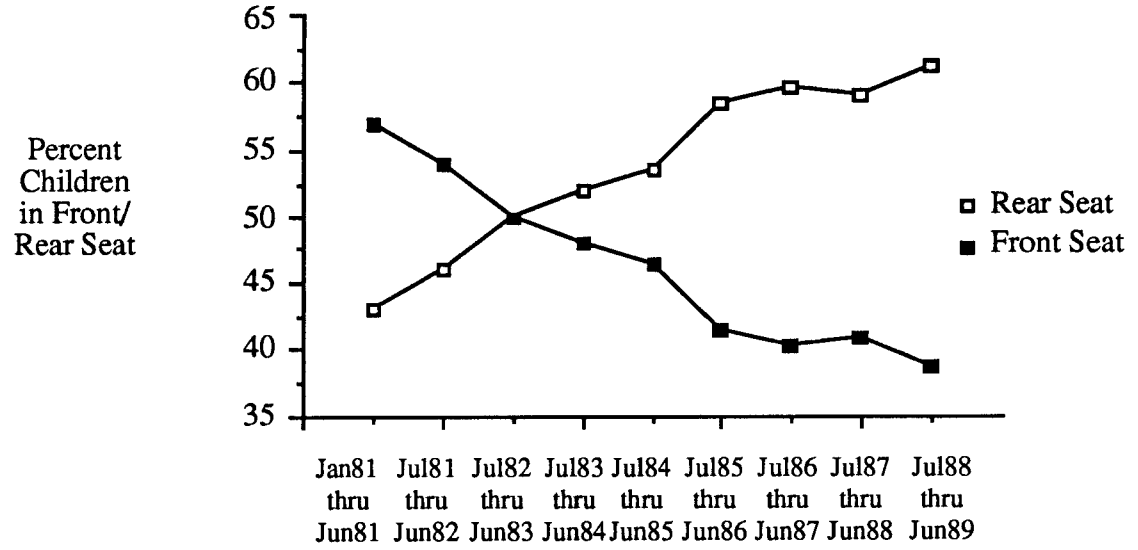


Figure 2. Percentage of Accident Involved 0-5 Year Old Children Riding in Front Seat Versus Rear Seat



these children (from 4% prior to 1982 to 72% in 1989) also increased substantially only after it was legislatively mandated.

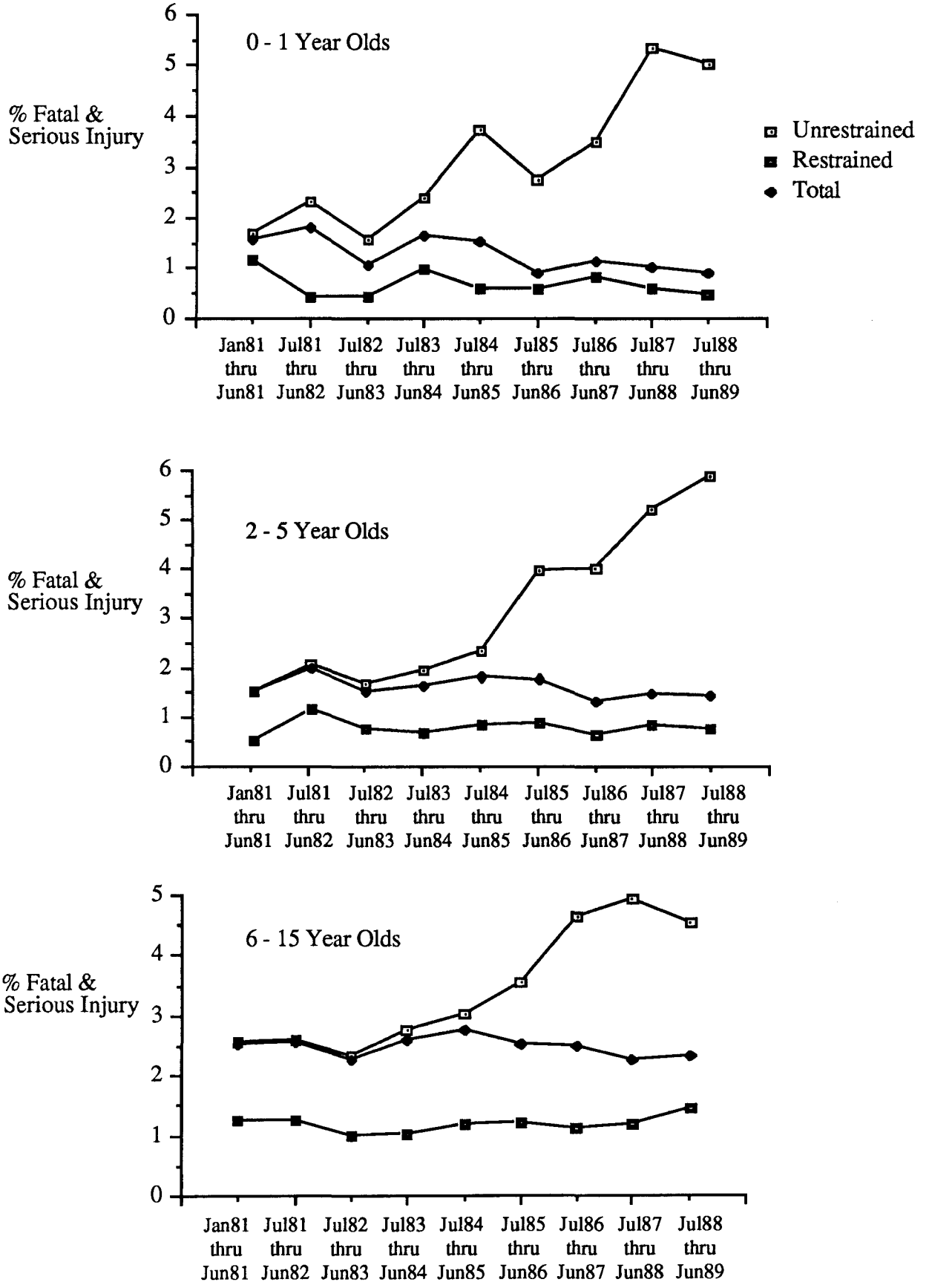
Figure 2 indicates another important trend that has been occurring during the past few years. Accident data in general indicates that the rear seat tends to be safer than the front seat regardless of restraint status. General child transportation safety information as well as instructions from safety seat manufacturers recommend that children be placed in the rear seat. As Figure 2 shows, more drivers are placing children in the rear seat. In the first six months of 1981, 57 percent of these children in crashes were in the front seat with 43 percent in the rear. During the last year, these proportions had been reversed and the differential was much larger. Between July 1988 and June 1989, only 39 percent of the children were in the front seat and 61 percent were being transported in generally safer rear seating positions. This same trend has not occurred among the 6-15 year olds. Four to five percent more 6-15 year olds have been front seat occupants each year during this time period.

Before proceeding any further in analyses of these accident data, note should be made of possible biases in these restraint usage rates. In the "typical" accident in North Carolina, the investigating officer arrives at the accident scene some time after the crash. By then, the occupants may have already exited the vehicles and perhaps have already been transported for medical treatment. Many times, the investigating officer will have to rely on the statements of the occupants to determine use or nonuse of restraints. With the use of restraints for children now mandatory, parents may or may not be truthful in their statements of restraint use for their children.

Previous comparisons of observed restraint usage rates for children and reported usage rates from the accident data appears to indicate that as children grow out of, or are taken out of their seats, they are more likely to go unrestrained but that when an accident occurs, the parent or driver tells the officer that the child was in a seat belt. Unless the officer has reason to believe otherwise, he or she will probably accept the statement and record the child as restrained. As will be discussed later, observational surveys conducted this past summer found that 72 percent of the 0-5 year old children were restrained. This figure itself is well below the 86 percent usage rate derived from accident reports but similar to the self-reported figure for respondents buckling up children "all the time" on mail-back questionnaires distributed in conjunction with the observational surveys. In addition, other HSRC research (Hunter, et al. 1988) found non-belt wearers to be overrepresented in crashes and thus one would expect usage rates to be lower for crashes than for observed usage rates.

The implications of this situation for the following analyses are several. First, actual restraint usage rates for children will not be as high as the accident data indicates. Secondly, comparisons between children classified as "restrained" and "unrestrained" must be viewed with caution since we cannot really be sure who was and who was not restrained. Thus, trends such as

Figure 3. Fatal plus Serious Injury Rates for Accident Involved Children, January, 1981 through June, 1989



injury rates for the total age group will be more valid than those for children classified as either restrained or unrestrained. Third, this misclassification of restraint use may lead to a conservative estimate of the injury reduction potential of restraint use since many of the unrestrained children are actually being classified as restrained and thus their injuries are being counted among the restrained. On the other hand, an exaggerated estimate of effectiveness can result when bias on the part of the investigating officer leads to assumptions, and subsequent reporting, of restraints being used if injuries are minor and not used if injuries are more severe.

The fatality figures in Table 1 and the fatal and serious injury rates in Figure 3 are encouraging to a degree but reveal that much work still needs to be done in protecting our children. Prior to 1979 when usage rates began to increase, fatalities were averaging 29.4 per year. Since 1979, fatalities have averaged 21.2 per year. Figure 3 plots the fatal plus serious injury (K+A) rates for 0-1, 2-5, and 6-15 year olds since 1981. For all age groups, the K+A rates for children reported to be unrestrained have been increasing across time. At the same time, the K+A rate for 0-1 year olds reported to have been restrained has increased only slightly across time (probably due to the increased exposure of more children to the most severe crashes, high levels of misuse of safety seats, and/or increased misreporting of restraint use), and the rates for the 2-5 and 6-15 year olds reported to have been restrained have stayed much more level. Since the 0-1 year olds have had a much larger proportion of children restrained, with a lower K+A rate, the overall K+A rate has been declining since 1982 with some fluctuations. On the other hand, the relatively small increases in restraint usage rates for the older children had the effect of keeping the K+A rates for the 2-5 and 6-15 year olds almost level rather than decreasing until the last few time periods. It is encouraging, however, to see that even with the extremely high K+A rate for reportedly unrestrained 2-5 year olds during July 1988 - June, 1989, the high proportion of children who were restrained enabled the overall rate to decrease below their rate for the years prior to July 1985 when restraint usage rates were much lower.

Table 2 shows the actual fatal and serious injury rates and the injury and population figures used to calculate these rates for Figure 3. Furthermore, average fatal plus serious injury rates have been computed for three time periods to try to measure the effects of legislation upon these rates. Time period "(A)" consists of the eighteen months immediately preceding the implementation of any child passenger protection law in North Carolina. Time period "(B)" consists of the three years (July 1982 - June 1985) that the original Child Passenger Safety (CPS) Law was in effect. During this time, only children less than age two being driven by their parents were required to be restrained. Period "(C)" consists of the first three years (July 1985 - June 1988) after the effective date of the expanded CPS Law. This expanded law requires all drivers to restrain all children through age five. Also, all drivers and front seat occupants of any age have been required to be buckled up since October 1985.

Table 2. Average Fatal Plus Serious Injury (K+A) Rates and Percent Change for Children < 16 Associated With NC Child Passenger Safety and Seat Belt Legislation

		(A) PRE-LAW		(B) ORIGINAL CPS LAW			(C) CURRENT CPS & BELT LAWS						
		Jan 81 Thru Jun 81	Jul 81 Thru Jun 82	Jul 82 Thru Jun 83	Jul 83 Thru Jun 84	Jul 84 Thru Jun 85	Jul 85 Thru Jun 86	Jul 86 Thru Jun 87	Jul 87 Thru Jun 88	Jul 88 Thru Jun 89			
AGE	# K+A	20	45	30	35	42	33	34	31	31			
0-1	Total #	1221	2514	2553	2133	2701	3337	2895	3046	3380	PERCENT CHANGE		
	% K+A	1.64	1.79	1.18	1.64	1.55	0.99	1.17	1.02	0.92	(A)' (B)	(B)' (C)	(A)' (C)
	Avg.%	1.74		1.45			1.02				-16.7	-29.7	-41.4
2-5	# K+A	75	205	169	183	214	213	178	213	207			
	Total #	4729	10204	10671	10926	11290	11798	12782	13479	13899			
	% K+A	1.59	2.01	1.58	1.67	1.90	1.81	1.39	1.58	1.49			
	Avg.%	1.88		1.72			1.56				-8.5	-9.3	-17.0
0-5	# K+A	95	250	199	218	256	246	212	244	238			
	Total #	5950	12718	13224	13059	13991	15135	15677	16525	17279			
	% K+A	1.60	1.97	1.50	1.67	1.83	1.63	1.35	1.48	1.38			
	Avg. %	1.85		1.67			1.45				-9.7	-13.2	-21.6
6-15	# K+A	295	660	604	697	780	719	789	737	697			
	Total #	11355	25269	25928	26145	27206	27737	30356	30473	29980			
	% K+A	2.60	2.61	2.33	2.67	2.87	2.59	2.60	2.42	2.32			
	Avg. %	2.61		2.65			2.48				+1.5	-6.4	-5.0

The youngest age group, 0-1 years old, showed a fatal plus serious (K+A) injury rate of 1.74 per 100 children involved in crashes during the first time period. This rate was reduced by 17 percent to 1.45 during the second time period. The K+A rate dropped 30 percent to 1.02 between the second time period and the third time period representing the expanded law. Overall, the K+A rate for 0-1 year olds was reduced by 41 percent, from 1.74 to 1.02 between the first and third time periods.

K+A rates have also been reduced for the 2-5 year olds as well, though not by the same degree. The second period K+A rate of 1.72 was a 9 percent reduction from the rate of 1.88 for the first time period. During this time, the 2-5 year olds were not covered by the CPS Law, but their restraint usage had increased nonetheless. After they became covered by the CPS Law during the third time period, their K+A rates was reduced another 9 percent to 1.56. The total reduction in the K+A rate for the 2-5 year olds was 17 percent, from 1.88 to 1.56, between the first and the third time periods.

Taken as a whole the expanded Child Passenger Safety Law has resulted in a 22 percent decrease (from 1.85 to 1.45) in fatal plus serious injury rates for children less than age six since the eighteen months prior to implementation of child passenger safety legislation in North Carolina.

The importance of restraint legislation is clearly documented by the K+A experience of the 6-15 year olds. These children and youths were not covered by any mandatory usage legislation until October 1985, and then only when riding in the front seat. Furthermore, high levels of restraint usage for all front seat occupants (60-78%) was not achieved until January, 1987 when the penalty phase of the Seat Belt Law went into effect. As shown in Figure 1, reported usage rates for the 6-15 year olds did not increase to any significant degree until they became covered and this is reflected in their K+A rates that have remained virtually constant across the three time periods. In fact, there was actually a 2 percent increase in the K+A rate between the first and second time periods. There was, however, a 6 percent decrease between the second and third time periods after they became subject to the Seat Belt Law.

Table 3 shows how these reductions in fatal and serious injury rates can be translated into estimates of actual lives saved and serious injuries reduced by increased restraint use associated with the Child Passenger Safety Law and to some degree the Seat Belt Law. In this table, an expected number of K+A injuries was computed for two time periods for each age group. This expected number was produced by multiplying the actual number of accident involved children of each age for the time periods July 82 - June 85 and July 85 - June 88 by the average K+A rate for the January 81 - June 82 period for the appropriate age group (from Table 2). This expected number is then compared to the actual number of K+A injuries seen in that time period. For instance, if the 0-1 year olds had continued to be killed at the same rate during July 82 - June 85 that they had during the Jan. 81 - June 82 period (1.74%), 129 0-1 year olds would have been

Table 3. Casualty Benefits for Children and Youths Associated with Implementation of Restraint Laws in North Carolina.

	July 82 - June 85			July 85 - June 88			July 82 - June 89
Age	Expected K+A	- Actual K+A	= K+A Benefit (% Change)	Expected K+A	- Actual K+A	= K+A Benefit (% Change)	K+A Benefit (% Change)
0-1	129	107	-22 (-17.1%)	220	129	-91 (-41.4%)	-113 (-32.4%)
2-5	618	566	-52 (-8.4%)	977	811	-166 (-17.0%)	-218 (-13.7%)
0-5	747	673	-74 (-9.9%)	1197	940	-257 (-21.5%)	-331 (-17.0%)
6-15	2069	2081	+12 (+0.6%)	3094	2942	-152 (-4.9%)	-140 (-2.8%)

killed or seriously injured during the time (.0174 x 7387 = 128.5). Instead, there were 107 actual K+A injuries during that time for a 17.1 percent reduction in K+A injuries of 22. Stated another way, this means that 22 children below age two were saved from death or serious injury between July 1982 and June 1985 due to implementation of the original Child Passenger Safety Law. During the next three years (July 85 - June 88), there was a 41 percent reduction in K+A injuries of 91. Overall, there has been a benefit of 113 0-1 year old children saved from K+A injuries since the original CPS Law was implemented in July 1985.

Among the 2-5 year olds, there has been a reduction of 218 K+A injuries below what would have been expected since July 1982. These children were not actually covered in the July 82 - June 85 period, but there was apparently enough of a spillover effect in terms of increased restraint use to produce an 8.4 percent (-52 K+A) benefit to these children during that time. Once they became covered by the expanded law in July 1985 the benefits basically doubled (8.4% vs. 17% reduction).

Apparently, the 6-15 year olds have benefitted very little from any spillover effects of the Child Passenger Safety Law. In fact, during the July 82 - June 85 period, a slight increase in the actual K+A rate translated into a 0.6 percent increase in actual K+A injuries over the expected number. There was a small 4.9 percent benefit associated with the actual number of K+A injuries seen in the July 85 - June 89 period (2942) when compared to the expected number (3094) based on the 2.61 K+A rate for the first time period. There was an overall reduction of 140 K+A injuries seen for the 6-15 year olds after July, 1982.

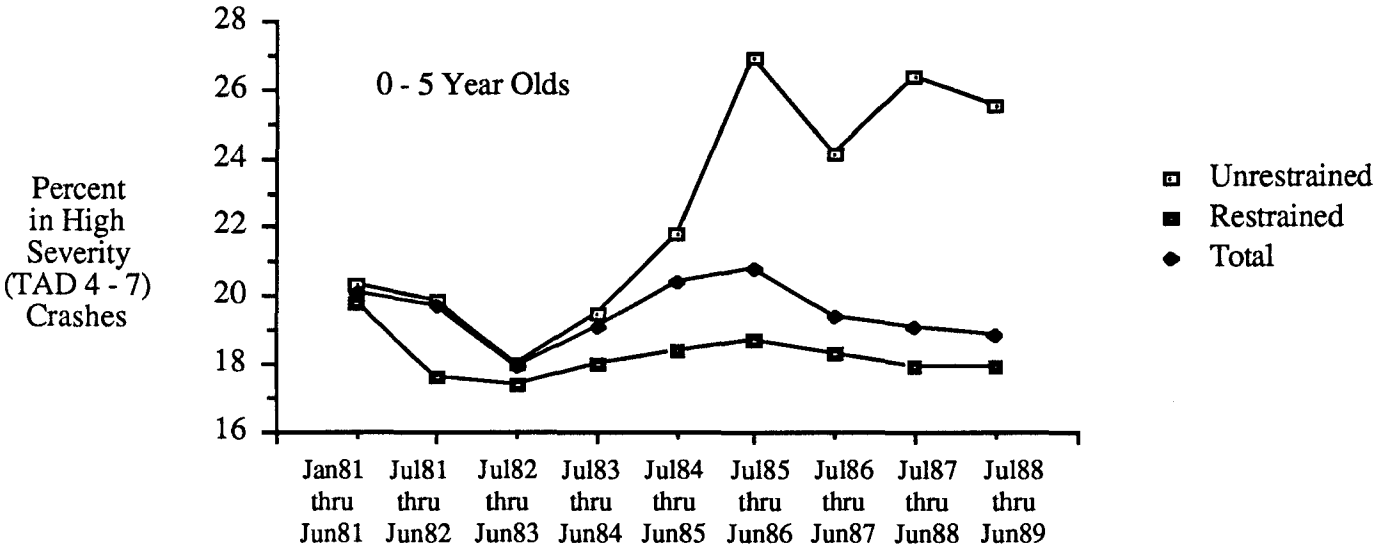
One may wonder, however, why the actual number of fatalities for 0-5 year olds has not declined very much in recent years even with a reported restraint usage rate of 86 percent. It appears that there are several factors operating to keep this number up. One is exposure. That is, in the July 1981 - June 1982 period, 12,718 children between ages of 0-5 were involved in N.C. car crashes. In the July 1988 - June 1989 period, however, 17,279 children were involved meaning that over 4500 additional children were exposed to car crashes during that time period.

Another factor to consider is crash severity. It does appear that crash severity is related to the increasing K+A rates for children reported to be unrestrained. Figure 4 illustrates that for each time period, children reported to be unrestrained tend to be involved more in severe crashes than the restrained children. Crash severity here is measured as the investigating officer's assessment of vehicle deformation (TAD rating). Severe crashes are herein defined as TAD ratings 4-7 on the 1-7 point TAD scale. For each time period, children reported to be unrestrained are overrepresented in severe crashes. Beginning in the July 84-June 85 period, the proportion of unrestrained children in severe crashes began to increase even more. While it appears that overall crashes are not becoming more severe, it is the case that the children who are reported not to be protected by restraint systems tend to be in more of the severe crashes and thus doubly exposed to serious injuries. While much of this difference is possibly real, it may be the fact that some of this difference is due to reporting bias. That is, an unrestrained child in a severe crash is more likely to be injured than in a less severe crash and the investigating officer would be less likely to accept the drivers report that the child was restrained and thus code the child as unrestrained.

Crash severity is affected by various factors, one of which is vehicle size. Due to their greater mass, larger heavier vehicles are inherently safer than smaller vehicles in similar crashes. The population of accident involved North Carolina children reflects current trends toward downsizing of vehicles. As Figure 5 indicates, about 21-23 percent of the accident involved children were in vehicles weighing less than 2500 pounds (roughly comparable to light compact and subcompact sized cars) during the first two time periods. This proportion increased to about 34 percent for the last three years, a 50 percent increase. This trend is important for at least two reasons. First, with the shift toward less safe downsized vehicles it is crucial that efforts be continued to get children properly buckled up. Second, this trend may help to explain why overall injury rates for young children have not decreased as much as might be expected based on the increased proportion of children reported to be buckled up. Even with correct restraint use, injuries are more likely to occur in smaller vehicles.

While looking at various trends associated with accident involved children, it is important to look at various factors in addition to restraint use to try to determine why the increased use of restraints for children has not had as great an impact on injuries, and especially fatalities, as might

Figure 4. Proportion of Restrained and Unrestrained Children in Severe (TAD Severity 4-7) Crashes, 1981 through June, 1989



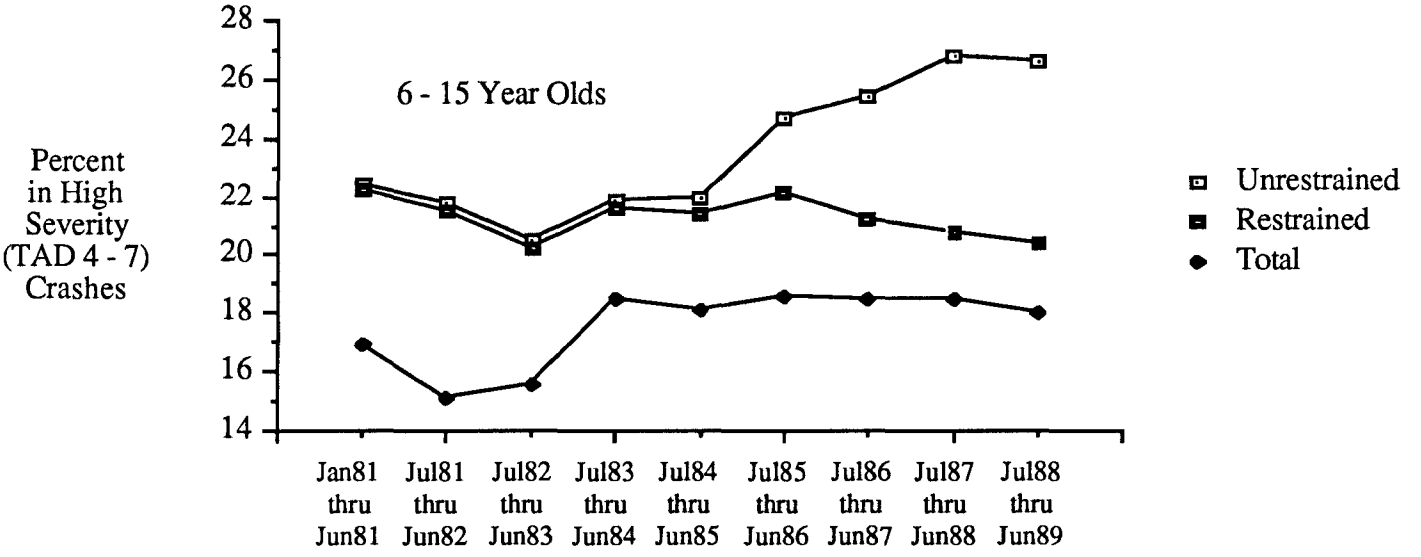


Figure 5. Percentage of Accident Involved 0-5 Year Old Children Riding in Vehicles Weighing Less than 2500 Pounds

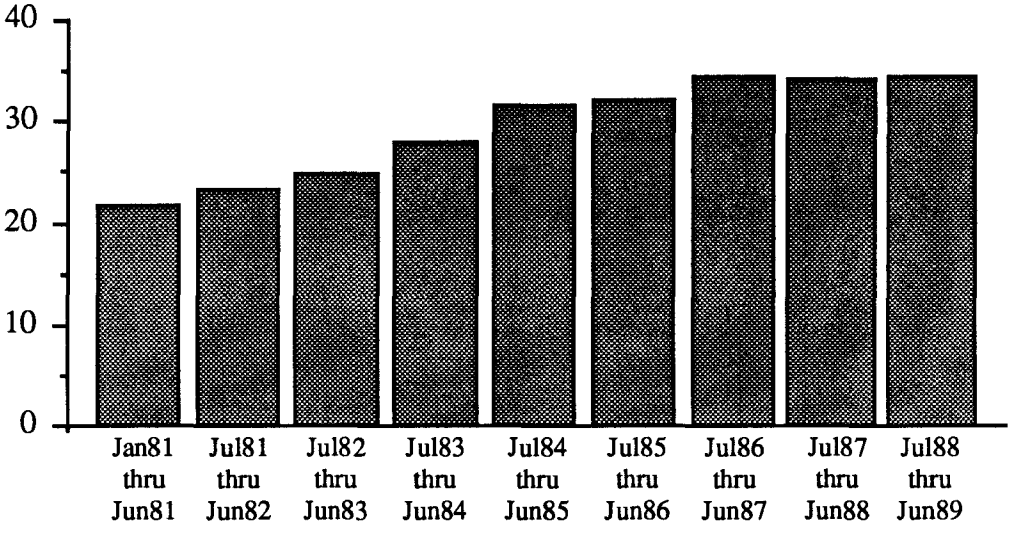
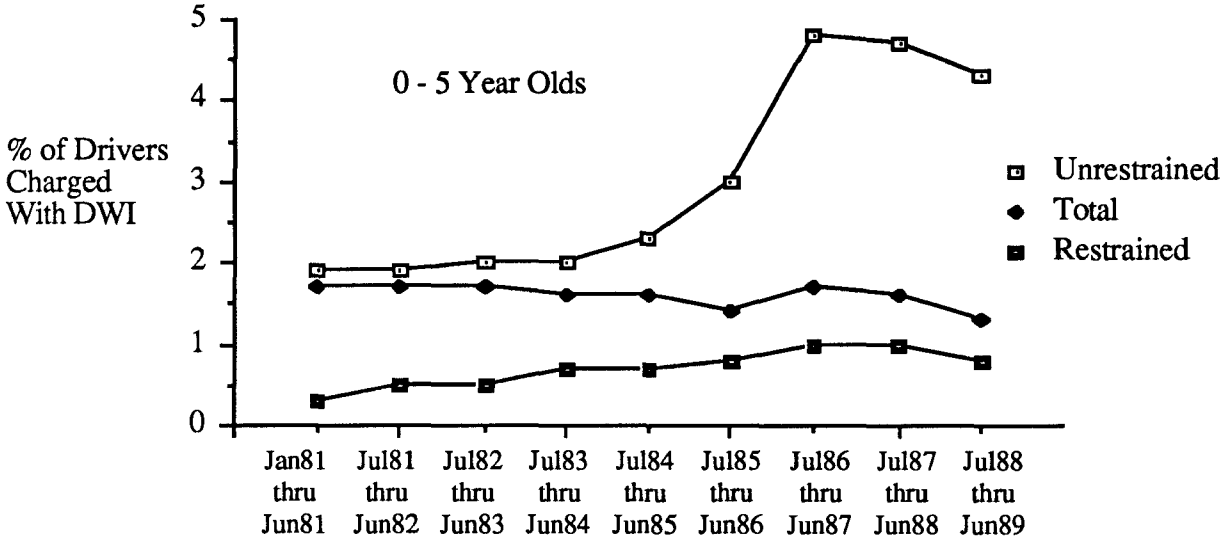
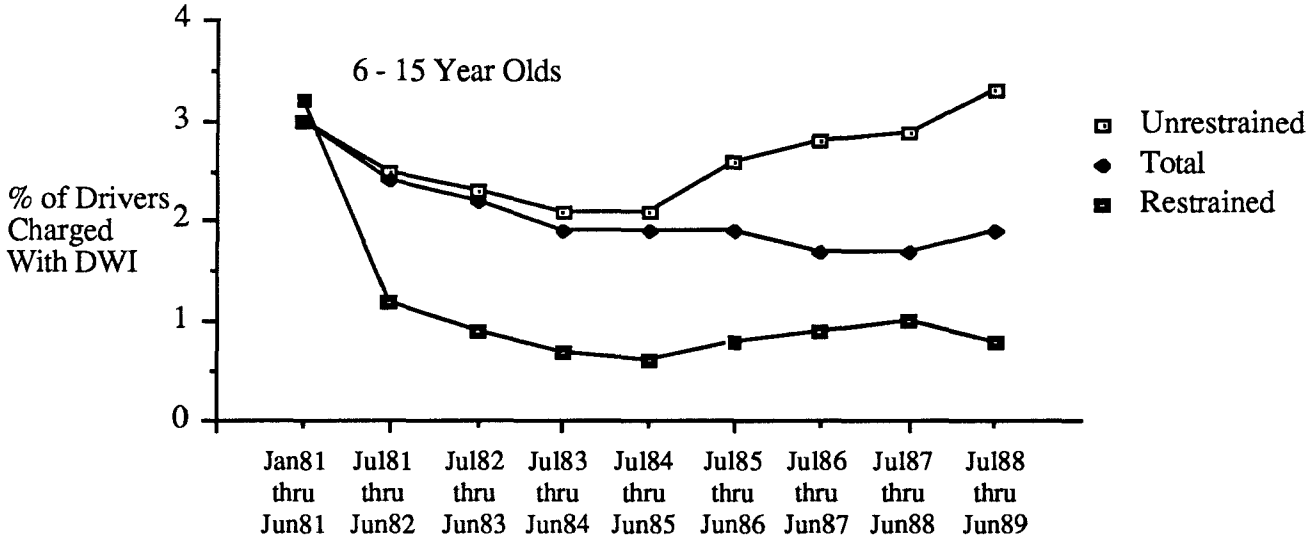


Figure 6. Percent of Drivers of 0-5 Year Old Children Charged with Driving While Impaired





be expected. In addition to restraint use and vehicle factors, the driver is also an important component of safe transportation.

One of the most dangerous practices is that of drinking while driving and Figure 6 indicates the percentage of drivers who were charged by the investigating officer with a Driving While Impaired violation after the accident. As can be seen, there has been an almost constant proportion, about 1.7 percent of all drivers with some yearly fluctuations, who were charged with DWI after the accidents involving 0-5 year olds. As can also be seen, there have always been large differences between drivers of children reported to be unrestrained and restrained with drivers of unrestrained children to have been much more likely to have been charged with DWI. This difference increased greatly during the past three years. The same general relationship is found for the 6-15 year olds as well. In essence, what Figure 6 indicates is that the children who need protection the most, that is, riding with drinking drivers, are much less likely to receive the protection that they need.

In large part, what the above discussion has shown is that the issue of restraint use for children is a complex one. North Carolina has a law that has had a great impact on this issue in that it has been the most effective means of getting parents and other drivers to restrain children in cars. At odds with the primary intent of this law -- to reduce deaths and injuries to children in car crashes -- are various driver and vehicles issues. As has been shown, most drivers are buckling up their children but the nonuse of restraints by a minority of "bad drivers" may be counteracting some of the potential overall benefits of increased restraint usage. As was shown, drivers of children reported to be unrestrained were more likely to have been drinking prior to the accident. At the same time, more and more children are riding in smaller vehicles which means that even when buckled up, chances of injury are increased.

Observational Surveys

Observational surveys were last conducted during the spring and summer of 1986. These surveys were repeated during this project year for several reasons. Through these surveys, we are able to actually see how children are being restrained in cars rather than relying entirely on information contained in the NC accident files and to some degree determine the accuracy of information on the accident files. Through these surveys we can determine the type of safety seats that are being used and to some degree we are able to determine whether or not these seats are being used correctly. In order to compare the results obtained through the 1989 surveys with those conducted during 1986, the same methodology and instruments were used for both. A detailed discussion of the 1986 surveys can be found in Orr, et al., 1986.

Observational surveys were conducted during June, July, August, and September in the eight North Carolina cities of Wilmington, Greenville, Fayetteville, Greensboro, Winston-Salem,

Charlotte, North Wilkesboro, and Asheville. Two days were spent in each city with surveys being conducted at a shopping center during the morning and at a day care center during the afternoon pick-up time. Shopping centers were based on factors such as traffic flow, the presence of a stop light at one or more major exits, and the cooperation of the shopping center management. Day care centers were selected based on factors such as size, presence of a parking lot rather than on-street parking, and the cooperation of the center director. In addition, one day care center in each city was subsidized, that is, the fees for at least some of the children were subsidized for parents who need assistance. The other center in each city was non-subsidized, that is, no public assistance was provided for any of the children at the center. This was done in order to assure as much variation in socioeconomic status as possible. In general, observations were conducted from 10:00 in the morning until 3:00 in the afternoon at the shopping centers. The observers then moved to the day care center to collect data from about 3:30 until the centers closed at 5:30 or 6:00.

The observers, who were HSRC project staff or hired and trained by HSRC for seat belt and child safety seat data collection, conducted the surveys by positioning themselves at one or two exits (depending on traffic flow) at each location to catch children in cars as they were preparing to pull out into traffic. At shopping centers, only those drivers who were already stopped for a stop light or sign were approached by the observers. The observers attempted to get all of the cars exiting the day care centers to stop. At all locations, drivers who did not wish to participate were allowed to drive past.

Once the observers approached a stopped car, the driver was asked to give the ages of the children in the car and how they were related to the driver. For each occupant in the car, the observer noted and recorded their seating position, age, sex, race, their relationship to the driver (for children), and restraint status. If time allowed, the drivers were asked if they were aware of the existence of North Carolina's Child Passenger Safety and Seat Belt laws and how far they would be travelling to their next stop. See Appendix A for a copy of the observational survey form.

In 1986, 4,114 occupants in 1,437 cars were observed with 1,555 of the occupants being less than six years of age. In 1989, 2,396 occupants in 928 cars were observed with 1,056 being less than six. The reasons for the reduced numbers for 1989 are not clear. For the most part, the same data collection sites were used for both years, but in some cases changes in sites had to be made or various reasons. Some of these alternate sites were not as productive as the ones used in 1986.

The hurried nature of the surveys did not allow for the observers to ask for as much information as was desired. For this reason, each driver was handed an envelope containing a mail back questionnaire (Appendix A). Also enclosed in the envelope was another sealed envelope containing information on North Carolina's restraint laws. Respondents were asked not to open

and review this material until after they had completed the survey. As an incentive for the drivers to fill out and return these questionnaires, the envelopes also contained a card that made the respondents eligible for a drawing for $100 if they returned the card along with their completed questionnaire. A total of 409 mail-back questionaires were received for a 44 percent completion rate.

Table 4 shows the observed restraint usage rates for children less than age six for the years 1986 and 1989. In 1986, 69 percent of the 0-5 year old children were restrained in some manner. In 1989, this figure increased by four percentage points to 73 percent. The biggest changes seem to be among the infants less than age one and the four year olds. In 1986, 14 percent of the infants were unrestrained but in 1989 only 2 percent were. Forty-one percent of the four year olds were unrestrained in 1986 and this figure decreased to 30 percent in 1989. Overall, there was a moderate increase from 34 to 38 percent in the percentage of 0-5 year olds who were buckled in safety seats. There was no difference in the proportion of children who were buckled in safety belts, but there was a definite shift in the types of belts being used. In 1986, 26 percent of the 0-5 year olds were in lap belts and 8 percent were in lap/shoulder combinations. In 1989, The percentage secured by lap belts declined to 16 percent and those in lap/shoulder belts increased to 19 percent. The same general trends show up for each age group in the 2-5 range. This shift could very well be the result of the recent negative publicity surrounding lap belts.

The level of safety seat usage shows mixed results. Overall, there was an increase from 34 to 38 percent in the percentage of 0-5 year olds observed to be in safety seats. Looking at the separate ages, however, it can be seen that there were large increases between the two years in safety seat usage for the infants and 1 year olds and a small increase for the two year olds, but there were decreases for the 3-5 year olds. It appears that while more children are being buckled up, parents of older children are relying on safety belts rather than seats.

The biggest area of concern in 1989 is the same as for 1986 and that is that the older children are protected by restraint systems much less often that the younger ones. The difference is much larger, however, for the 1989 sample. In 1986, 14 percent of the infants under one were unrestrained and this proportion increased to 43 percent unrestrained for the 5 year olds for a difference of 29 percentage points. In 1989, only two percent of the infants were unrestrained and 41 percent of the 5 year olds were for a difference of 39 percentage points.

Table 5 shows restraint usage status for children observed at the three different types of locations of subsidized day care centers, non-subsidized day cares, and shopping centers. This table also shows that the largest portion of the difference between the total number of observations collected between the two times was at shopping centers. In 1986, 792 children were observed at shopping centers but in 1989 only 321 were observed at these locations. Table 5 contains some relatively surprising findings. In 1986, subsidized day care centers, with a presumably lower

Table 4. Observed Restraint Usage Rates for Children by Age

	1986					1989				
	None	Lap Belt	Lap & Shldr	Safety Seat	Total	None	Lap Belt	Lap & Shldr	Safety Seat	Total
			Row %/(N)		Col. %			Row %/(N)		Col. %
Age 0	13.8	2.2	0.7	83.3	9.1	2.4	1.2	0.0	96.4	7.95
	(19)	(3)	(1)	(115)	(138)	(2)	(1)	(0)	(81)	(84)
1	15.4	7.4	3.1	74.1	10.7	10.6	3.5	2.8	83.1	13.5
	(25)	(12)	(5)	(120)	(162)	(15)	(5)	(4)	(118)	(142)
2	27.9	17.7	4.0	50.4	18.0	24.4	12.4	9.6	53.6	19.8
	(76)	(48)	(11)	(137)	(272)	(51)	(26)	(20)	(112)	(209)
3	29.6	36.8	6.6	27.0	22.1	30.1	22.9	22.1	24.9	23.6
	(99)	(123)	(22)	(90)	(334)	(75)	(57)	(55)	(62)	(249)
4	40.6	37.5	12.1	9.9	21.3	30.0	34.3	33.3	5.2	21.9
	(131)	(121)	(39)	(32)	(323)	(86)	(68)	(56)	(21)	(231)
5	42.7	32.5	16.8	8.0	18.9	41.1	23.4	29.1	6.4	13.4
	(122)	(93)	(48)	(23)	(286)	(58)	(33)	(41)	(9)	(141)
0-5	31.2	26.4	8.3	34.1	100.0	27.2	15.9	18.8	38.2	100.0
	(472)	(400)	(126)	(517)	(1515)	(287)	(168)	(198)	(403)	(1056)

Table 5. Observed Restraint Usage Rates for Children <6 by Survey Location

Location	1986 None	1986 Lap Belt	1986 Lap & Shldr	1986 Safety Seat	1986 Total	1989 None	1989 Lap Belt	1989 Lap & Shldr	1989 Safety Seat	1989 Total
	Row %/(N)				Col. %	Row %/(N)				Col. %
Subsidized Day Care	37.9 (155)	24.0 (98)	11.3 (46)	26.9 (110)	26.3 (409)	27.5 (104)	20.1 (76)	21.7 (82)	30.7 (116)	36.0 (378)
Non-Sbsdzed Day Care	18.1 (64)	31.9 (113)	13.6 (48)	36.4 (129)	22.8 (354)	29.0 (102)	21.3 (75)	15.1 (53)	34.7 (122)	33.5 (352)
Shopping Center	35.1 (278)	24.0 (190)	5.6 (44)	35.4 (280)	50.9 (792)	24.6 (79)	14.6 (47)	9.4 (30)	51.4 (165)	30.5 (321)
Total	31.9 (497)	25.8 (401)	8.9 (138)	33.4 (519)	100.0 (1555)	27.1 (285)	18.8 (198)	15.7 (165)	38.3 (403)	100.0 (1051)

Table 6. Observed Restraint Use for Children <6 by Race

Race	1986 Yes	1986 No	1986 Total	1989 Yes	1989 No	1989 Total
	Row %/(N)		Col. %	Row %/(N)		Col. %
White	76.8 (817)	23.2 (247)	73.4 (1064)	79.9 (581)	20.1 (146)	68.9 (727)
Non-White	48.1 (185)	51.9 (200)	26.6 (385)	56.7 (486)	43.3 (142)	31.1 (328)
Total	69.2 (1002)	30.8 (447)	100.0 (1449)	72.7 (767)	27.3 288	100.0 (1055)

socioeconomic status clientele, showed a rate of 38 percent of the children unrestrained. In 1989 this figure was reduced to 27 percent. In contrast, the non-subsidized day cares in 1986 showed a much lower unrestrained rate of 18 percent but in 1989 this figure actually increased to 29 percent unrestrained. In 1986, children at non-subsidized day care centers were unrestrained only about half as often as at the other locations but in 1989 the rates for children being unrestrained were very similar. The reason for this cannot be explained.

Table 6 presents a breakdown of restraint status for children less than six by race. In 1989 as was the case in 1986, white children were observed to be restrained more often than the non-white children. There was however a closing of the difference between the two time periods. In 1986, 77 percent of the white children and only 48 percent of the non-white children were observed to be restrained. In 1989, the restraint rate for white children had increased slightly to 79 percent but there was a much larger increase in the restraint usage rate for the non-white children to 57 percent. This increase among a specific population is encouraging.

As Table 7 shows, parents and grandparents were about twice as likely to buckle children in their cars as were other relatives and non-relatives in 1986. The results for 1989 are encouraging in that both the other relative and non-relative groups greatly increased in the proportion of children riding in their cars being buckled up. In fact, in 1989 the non-relatives buckled up children in their cars as much as grandparents but the other relatives are still lagging about 13 percentage points behind.

During the 1989 surveys, 403 children were observed to be riding in some type of safety seat, either an infant carrier, toddler seat or booster seat. Of that number the observers were able to make a judgment on the correctness of use for 377 safety seats. The proportion of safety seats observed to be correctly and incorrectly used are shown in Table 8. It must be pointed out that due to the nature of the survey procedures, the observers were able to make judgments on "gross misuse" only. With the short amount of time for each observation and with the observer positioned outside of the vehicle where it was often difficult to see inside clearly, it was possible only to determine if the seat was facing in the proper position, if there was a harness being used at all to hold the child within the seat, and if there was a seat belt being used at all to hold the seat within the vehicle. Other surveys done with more time allowed for closer inspections of seats in use have found much higher levels of misuse than were found with this method (Cynecki and Goryl, 1984). Table 8 does show, however, that the level of gross misuse has declined from 1986 to 1989. In 1986, 79 percent of the seats were observed to be used correctly to the extent that they were facing in the right direction and that there was a harness or shield holding the child and a safety belt holding the seat in place. In 1989 the percentage of seats being used correctly increased to 86 percent. Of the remaining 14 percent, three percent were infants facing to the front of the car, 8 percent had no harness being used and 3 percent had no safety belt being used to secure the seat.

Table 7. Observed Restraint Use for Children <6 by Their Relationship to Driver

Relationship to Driver	1986			1989		
	Yes	No	Total	Yes	No	Total
	Row %/(N)		Col. %	Row %/(N)		Col. %
Child	73.0 (831)	27.0 (308)	84.7 (1139)	74.5 (631)	25.5 (216)	83.2 (847)
Grandchild	64.6 (73)	35.4 (40)	8.4 (113)	70.4 (57)	29.6 (24)	8.0 (81)
Other Relative	36.1 (12)	63.9 (24)	2.7 (36)	56.8 (21)	43.2 (16)	3.6 (37)
Non-Relative	32.1 (18)	67.7 (38)	4.2 (56)	69.8 (37)	30.2 (16)	5.2 (53)
Total	69.5 (934)	30.5 (410)	100.0 (1344)	73.3 (746)	26.7 (272)	100.0 (1018)

Table 8. Proportion of Safety Seats Observed to be Correctly and Incorrectly Used.

Type of Use	1986	1989
	Col%/(N)	Col%/(N)
Correct Use	78.8 (341)	86.2 (325)
Front/Rear Error	9.5 (41)	2.7 (10)
No Harness Used	9.9 (43)	7.7 (29)
No Seat Belt Used	1.8 (8)	3.4 (13)
Total	100.0 (433)	100.0 (377)

The percentages for front/rear facing errors and no harness being used were both reductions from the levels seen in 1986 but the three percent no belt used was a slight increase over the figure for 1986. Even though the gross misuse of seats has been reduced, there is still much room for improvement to help insure that all children in safety seats are getting all of the protection that they deserve.

Mail-back Questionnaires

Tables 9-13 are based on the data obtained through the mail-back questionnaires. As was previously mentioned, there were 409 questionnaires that were completed and returned. Table 9 shows the level of knowledge that the respondents had concerning the Child Passenger Safety Law for both 1986 and 1989. Overall, there is very little difference between the two years in terms of the levels of knowledge for the individual components. There was a decrease in the proportion of respondents that knew that this law covers children less than six years of age and there was a two-fold increase in the proportion of respondents who knew that the penalty for a violation is a fine of $25. Table 10 lists the proportion of respondents who got various numbers of questions in this series about the CPS Law correct. There were relatively small decreases in the percentage of respondents who scored either one, two, or three questions correct. The percentage that scored all four correct doubled from 10 to 20 percent between the two years. It appears that more people are becoming aware of the components of this law but there is certainly much room for improvement.

Tables 11 and 12 present the same type of information for the Seat Belt Law. As Table 11 shows, the respondents' knowledge of the individual components of the Seat Belt Law are similar to the CPS Law for the items of who is covered and what the penalties are. As with the CPS Law, there was little difference between the two years for who is covered and there is a doubling of the percentage who knew the correct penalty is a fine of $25. There was an extremely large decrease in the percentage of respondents who knew that vehicles not required to have belts and certain delivery vehicles are exempt. Table 12 indicates that there may be more confusion over the components of the Seat Belt Law than for the CPS Law. Due to the low number of respondents who knew the correct exemptions to the Seat Belt Law, only 6 percent answered all three questions in the series correctly. Whereas close to two-thirds answered either three or four questions on the CPS Law correctly, only a little more than a third were able to answer either two or three of the questions on the Seat Belt Law correctly. At the other end, only 1 percent did not answer any of the CPS Law questions correctly but 17 percent did not answer any of the Seat Belt Law questions correctly.

Table 9. Respondents' Knowledge of Components of Child Passenger Safety Law. Mail-back Questionnaire.

Law Component	1986 Correct Answer	1986 Incorrect Answer	1986 Total	1989 Correct Answer	1989 Incorrect Answer	1989 Total
	Row%/(N)			Row%/(N)		
Children <6 Covered	68.8 (335)	31.2 (152)	100.0 (487)	60.4 (247)	39.6 (162)	100.0 (409)
Belt Substitute at Age 3	71.8 (349)	28.2 (137)	100.0 (486)	72.4 (296)	27.6 (113)	100.0 (409)
Affects All Drivers	95.1 (463)	4.9 (24)	100.0 (487)	95.6 (391)	4.4 (18)	100.0 (409)
Penalty of $25	18.9 (92)	81.1 (394)	100.0 (486)	45.2 (185)	54.8 (224)	100.0 (409)

Table 10. Number of Correct Answers to Series of Child Passenger Safety Law Questions. Mail-back Questionnaires.

# of Correct Answers	1986 Col%/(N)	1989 Col%/(N)
0	0.6 (3)	1.2 (5)
1	8.7 (42)	5.9 (24)
2	35.3 (171)	31.3 (128)
3	46.0 (223)	41.3 (169)
4	9.5 (46)	20.3 (83)
Total	100.0 (485)	100.0 (409)

Table 11. Respondents' Knowledge of Components of Seat Belt Law. Mail-back Questionnaire.

Law Component	1986 Correct Answer Row%/(N)	1986 Incorrect Answer Row%/(N)	1986 Total	1989 Correct Answer Row%/(N)	1989 Incorrect Answer Row%/(N)	1989 Total
Drivers and Front Occupants Covered	65.9 (325)	34.1 (168)	100.0 (493)	68.7 (281)	31.3 (128)	100.0 (409)
Vehicles Exempted	59.2 (292)	40.8 (201)	100.0 (493)	12.5 (51)	87.5 (358)	100.0 (409)
Penalty of $25	20.8 (102)	79.2 (389)	100.0 (491)	43.5 (178)	56.5 (231)	100.0 (409)

Table 12. Number of Correct Answers to Series of Seat Belt Law Questions. Mail-back Questionnaires.

# of Correct Answers	1986 Col%/(N)	1989 Col%/(N)
0	16.3 (80)	18.6 (76)
1	31.8 (156)	43.8 (179)
2	41.8 (205)	32.0 (131)
3	10.2 (50)	5.6 (23)
Total	100.0 (491)	100.0 (409)

The respondents were asked to indicate how often they buckled up their children in cars. As Table 13 shows, 83 percent said that they buckled up their children all of the time. This self-reported figure is a full ten percentage points higher than the 72 percent of the children who were actually observed to be restrained. When the category of "most of the time" is included, 96 percent of the respondents said that they buckle up their children all or most of the time.

If the respondents indicated that they buckled up their children other than all of the time, they were asked to indicate the reasons that they did not do so all the time and when they were most likely to buckle them up. Table 14 shows that the major reason (24%) given in 1989 for not buckling their children all of the time was for the child to sleep or to feed or otherwise tend to the child's needs. This is in contrast to 1986 when the primary reason (28%) given was because they forgot or were not in the habit. In 1989, only 5 percent said that they forgot or were not in the habit. Those who indicated that they were less likely to buckle their children on short trips increased from 11 percent in 1986 to 19 percent in 1989. There was also a small increase in the percentage who gave being in a hurry or that is was a hassle as a reason for not buckling up children all of the time. This pattern seems to indicate that drivers are making a conscious decision while driving children that restraints are not needed on that particular trip or under particular conditions. This would indicate that more effort needs to be made to convince drivers that protection is needed at all times and the increased protection is worth the extra effort.

Table 15 lists the times when the respondents are most likely to restrain their children. The second most reported reason (34%) is when they remember to buckle them up which includes being reminded by their children. The reason reported the most (38%) was that they are most likely to buckle children on long trips. It appears that the perception that restraints are needed most on long trips continues to persist.

Respondents were also asked to indicate how often they wear their own safety belts. As Table 16 shows, 74% of the respondents indicated that they wear their own belts all of the time. This is a large increase over the 60 percent who reported likewise in 1986. When the "most of the time" category is added in, 93 percent indicated that they wear their own belts all or most of the time. This self-reported usage is much higher than the 68 percent observed usage rate for drivers in the 1989 observations.

Tables 17 and 18 show the reasons that the respondents do not wear their own belts all of the time and when they are most likely to wear their belts. There is not much difference in Table 17 between 1986 and 1989 for the reasons given for not wearing belts. For both years, the reason given most was that they forget to buckle up or that they are not in the habit. There were increases in the percentage that said that they were least likely to buckle up on short trips and when they were in a hurry. As Table 18 shows, the respondents reported in 1989 that they were most likely to wear their own belts when they are on long trips or when they remember. This is basically the

Table 13. How Often Do Respondents Buckle Children?
Mail-back Questionnaire.

Buckle Children	1986	1989
	Col%/(N)	Col%/(N)
All of the time	79.0 (388)	82.7 (334)
Most of the time	14.5 (71)	13.1 (53)
Half of the time	3.3 (16)	1.5 (6)
Some of the time	3.1 (15)	2.5 (10)
Never	0.2 (1)	0.2 (1)
Total	100.0 (491)	100.0 (404)

Table 14. Why Do Respondents Not Buckle Children All the Time?
Mail-back Questionnaire.

Reason	1986	1989
	Col%/(N)	Col%/(N)
Forget, not in habit	28.4 (27)	5.2 (3)
Short trips	10.5 (10)	19.0 (11)
To sleep, feed, tend child	12.6 (12)	24.1 (14)
Hassle, in a hurry	11.6 (11)	15.5 (9)
Child doesn't like	16.8 (16)	19.0 (11)
Other	20.0 (19)	17.2 (10)
Total	100.0 (95)	100.0 (58)

Table 15. When Are Respondents Most Likely to Buckle Their Children? Mail-back Questionnaire.

Reason	1986	1989
	Col%/(N)	Col%/(N)
Bad conditions, weather	13.1 (11)	9.4 (5)
Long trips	41.7 (35)	37.7 (20)
Not sleeping, feeding	7.1 (6)	0.0 (0)
When remember	13.1 (11)	34.0 (18)
Other	25.0 (21)	18.9 (10)
Total	100.0 (84)	100.0 (53)

Table 16. How Often Do Respondents Wear Their Own Seat Belts? Mail-back Questionnaire.

Buckle Selves	1986	1989
	Col%/(N)	Col%/(N)
All of the time	59.8 (295)	73.8 (301)
Most of the time	21.7 (107)	19.1 (78)
Half of the time	5.9 (29)	2.9 (12)
Some of the time	9.1 (45)	3.2 (13)
Never	3.4 (17)	1.0 (4)
Total	100.0 (493)	100.0 (408)

Table 17. Why Do Respondents Not Wear Their Own Seat Belts All the Time? Mail-back Questionnaire.

Reason	1986	1989
	Col%/(N)	Col%/(N)
Forget, not in habit	45.7 (86)	43.5 (37)
Short trips	11.7 (22)	18.8 (16)
Uncomfortable, don't like them	20.7 (39)	16.5 (14)
Hassle, in a hurry	5.3 (10)	10.6 (9)
Personal choice	2.1 (4)	2.4 (2)
Other	14.4 (27)	8.2 (7)
Total	100.0 (188)	100.0 (85)

Table 18. When Are Respondents Most Likely Wear Their Own Seat Belts? Mail-back Questionnaire.

Reason	1986	1989
	Col%/(N)	Col%/(N)
Bad conditions, weather	14.4 (23)	14.1 (11)
Long trips	48.1 (77)	43.6 (34)
When remember	20.6 (33)	29.5 (23)
Other	16.9 (27)	12.8 (10)
Total	100.0 (160)	100.0 (78)

same pattern that was reported in 1986. From this information it appears that work continues to need to be done in the area of getting drivers in the habit of wearing their belts for every trip regardless of conditions and distance.

Conclusions

The following conclusions can be drawn based on this analysis of children involved in North Carolina accidents:

a) The North Carolina Child Passenger Protection and Seat Belt Laws, along with associated public information and education efforts, have resulted in large increases in restraint use as reported on police accident forms. In the year prior to the initial CPP Law's effective date of July 1, 1982, 21% of the 0-1 year olds, 8% of the 2-5 year olds and 4% of the 6-15 year olds were reported to be restrained. During the year July 1988 - June, 1989, these rates were 91%, 86% and 72% respectively.

b) Average fatal plus serious (K+A) injury rates for children involved in accidents during this same time period have declined. During the eighteen months (January 1981 - June 1982) immediately preceding the implementation of the original CPP Law, K+A rates were 1.74 for 0-1 year olds, 1.88 for 2-5 year olds, and 2.61 for 6-15 year olds. During the July 1985 - June 1989 time period, average K+A rates were reduced 41% to 1.02 for 0-1 year olds, by 17% to 1.56 for 2-5 year olds, and by 5% to 2.48 for the 6-15 year olds.

c) Children reported to be unrestrained are more likely to have been in more severe crashes and/or to have been riding with a driver charged with Driving While Impaired.

d) The downsizing of the cars in which children are riding means that there will continue to be a need to stress the importance of correct restraint use for children and adults.

e) The implementation of restraint legislation has resulted in 17 percent reduction in fatal and serious injuries to 0-5 year old children in North Carolina crashes since July 1982. For 6-15 year olds, a 2.8 percent reduction was found. In terms of actual numbers, fatal and serious injuries have been reduced by 331 for 0-5 year olds and by 140 for 6-15 year olds since July 1982.

The following conclusions can be drawn from the analysis of observational and mailback questionnaire data collected during this project year:

f) There was a moderate increase in the percentage of children observed to have been restrained between the years 1986 and 1989. In 1986, 69 percent of the 0-5 year old children were restrained in some manner. In 1989, this figure increased by four percentage points to 73 percent. Overall, there was an increase from 34 to 38 percent in the percentage of 0-5 year olds who were buckled in safety seats. There was no difference in the proportion of children who were buckled in safety belts, but there was a definite shift in the types of belts being used. In 1986, 26 percent of

the 0-5 year olds were in lap belts and 8 percent were in lap/shoulder combinations. In 1989, The percentage secured by lap belts declined to 16 percent and those in lap/shoulder belts increased to 19 percent. The same general trends show up for each age group in the 2-5 range.

g) Overall, there was an increase from 34 to 38 percent in the percentage of 0-5 year olds observed to be in safety seats. Looking at the separate ages, however, it can be seen that there were large increases between the two years in safety seat usage for the infants and 1 year olds and a small increase for the two year olds, but there were decreases for the 3-5 year olds. It appears that while more children are being buckled up, parents of older children are relying on safety belts rather than seats.

h) The fact that older children are protected by restraint systems much less often that the younger ones continues to be an area of concern. In 1986, 14 percent of the infants under one were unrestrained and this proportion increased to 43 percent unrestrained for the 5 year olds for a difference of 29 percentage points. In 1989, only two percent of the infants were unrestrained and 41 percent of the 5 year olds were for a difference of 39 percentage points.

i) In 1989 as was the case in 1986, white children were observed to be restrained more often than the non-white children. There was however a closing of the difference between the two time periods. In 1986, 77 percent of the white children and only 48 percent of the non-white children were observed to be restrained. In 1989, the restraint rate for white children had increased slightly to 79 percent but there was a much larger increase in the restraint usage rate for the non-white children to 57 percent.

j) Parents and grandparents were about twice as likely to buckle children in their cars as were other relatives and non-relatives in 1986. In 1989, both the "other relative" and "non-relative" groups greatly increased in the proportion of children riding in their cars being buckled up. In fact, in 1989 the "non-relatives" buckled up children in their cars as much as grandparents but the "other relatives" are still lagging about 13 percentage points behind.

k) The level of gross misuse of safety seats has declined from 1986 to 1989. In 1986, 79 percent of the seats were observed to be used correctly to the extent that they were facing in the right direction and that there was a harness or shield holding the child and a safety belt holding the seat in place. In 1989 the percentage of seats being used correctly increased to 86 percent. Of the remaining 14 percent, three percent were infants facing to the front of the car, 8 percent had no harness being used and 3 percent had no safety belt being used to secure the seat. The percentages for front/rear facing errors and no harness being used were both reductions from the levels seen in 1986 but the three percent no belt used was a slight increase over the figure for 1986.

l) There is very little difference between the two years in terms of the levels of knowledge that the respondents had concerning the Child Passenger Safety Law for the individual components. There was a decrease in the proportion of respondents that knew that this law covers

children less than six years of age and there was a two-fold increase in the proportion of respondents who knew that the penalty for a violation is a fine of $25. The percentage that scored all four components correct doubled from 10 to 20 percent between the two years.

m) The respondents' knowledge of the individual components of the Seat Belt Law are similar to the CPS Law for the items of who is covered and what the penalties are. As with the CPS Law, there was little difference between the two years for who is covered and there is a doubling of the percentage who knew the correct penalty is a fine of $25. There was an extremely large decrease in the percentage of respondents who knew that vehicles not required to have belts and certain delivery vehicles are exempt. Due to the low number of respondents who knew the correct exemptions to the Seat Belt Law, only 6 percent answered all three questions in the series correctly.

n) Eighty-three percent of the questionnaire respondents said that they buckled up their children all of the time. This self-reported figure is a full ten percentage points higher than the 72 percent of the children who were actually observed to be restrained. The major reason (24%) given in 1989 for not buckling their children all of the time was for the child to sleep or to feed or otherwise tend to the child's needs. This is in contrast to 1986 when the primary reason (28%) given was because they forgot or were not in the habit. In 1989, only 5 percent said that they forgot or were not in the habit. Table 15 lists the times when the respondents are most likely to restrain their children. The reason reported most often (38%) for when they are most likely to buckle thier children was when on long trips.

o) Seventy-four percent of the respondents indicated that they wear their own belts all of the time. This is a large increase over the 60 percent who reported likewise in 1986. There is not much difference in between 1986 and 1989 for the reasons given for not wearing belts. For both years, the reason given most was that they forget to buckle up or that they are not in the habit. The respondents reported in 1989 that they were most likely to wear their own belts when they are on long trips or when they remember. This is basically the same pattern that was reported in 1986.

References

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Hunter, W.W., Stutts, J.C., Stewart, J.R., and Rodgman, E.A. "Overrepresentation of Seat Belt Non-Users in Traffic Crashes." UNC Highway Safety Research Center, Chapel Hill, North Carolina, April, 1988. (HSRC-TR 74)

Hunter, W.W., Reinfurt, D.W., Stutts, J.C., St. Cyr, C., and Hall, W.L. "Project Report for GHSP Project: Increased Seat Belt Use Through Police Actions." UNC Highway Safety Research Center, Chapel Hill, North Carolina, November, 1989. (HSRC-A 142)

Orr, B.T., Hall, W.L., Marchetti, L.M., Woodward, A.R., and Suttles, D.T. "Increasing Child Restraint Usage Through Local Education and Distribution Efforts." UNC Highway Safety Research Center, Chapel Hill, North Carolina, October, 1986 (HSRC-PR 148)

Appendix A

Observational Survey and Mail-Back Questionnaire Forms

DATE: ___/___/___ (M / D / Y)

OBSERVER: ___ ___ ___

CITY: AVLE CRLT FTVL GBRO GVLE WKBO WMTN WSTN

LOCATION: SHOPPING CENTER / DAY CARE

	OCCUPANTS →	DR	2	3	4	5	6	7	COMMENTS
POSITION	DRIVER	DR	DR	DR	DR	DR	DR	DR	
	CENTER FRONT		CF	CF	CF	CF	CF	CF	
	RIGHT FRONT		RF	RF	RF	RF	RF	RF	
	LEFT REAR		LR	LR	LR	LR	LR	LR	
	CENTER REAR		CR	CR	CR	CR	CR	CR	
	RIGHT REAR		RR	RR	RR	RR	RR	RR	
	OTHER		OT	OT	OT	OT	OT	OT	=
AGE									
SEX	MALE	M	M	M	M	M	M	M	
	FEMALE	F	F	F	F	F	F	F	
RACE	WHITE	W	W	W	W	W	W	W	
	BLACK	B	B	B	B	B	B	B	
	OTHER	O	O	O	O	O	O	O	
RELATION TO DRIVER	CHILD		C	C	C	C	C	C	
	GRANDCHILD		G	G	G	G	G	G	
	OTHER RELATIVE		R	R	R	R	R	R	
	NON RELATIVE		N	N	N	N	N	N	
RESTRAINT ☐Manual Automatic ☐3pt L/S ☐Motorized ☐Non-Motor ☐ShldrOnly	NONE	1	1	1	1	1	1	1	
	ON LAP	2	2	2	2	2	2	2	
	SHOULDER ONLY	3	3	3	3	3	3	3	
	LAP ONLY	4	4	4	4	4	4	4	
	L&S - CORRECT	5	5	5	5	5	5	5	
	L&S - BEHIND BACK	6	6	6	6	6	6	6	
	L&S - UNDER ARM	7	7	7	7	7	7	7	
	NON CRASH TESTED	8	8	8	8	8	8	8	
CHILD RESTRAINT	INFANT ONLY	9	9	9	9	9	9	9	
	CONVERTIBLE-HARNESS	10	10	10	10	10	10	10	
	CNVRTBLE-HAR/SHIELD	11	11	11	11	11	11	11	
	BOOSTER-HARNESS	12	12	12	12	12	12	12	
	BOOSTER-SHIELD	13	13	13	13	13	13	13	
HOW CHILD RESTRAINT USED	CORRECT	1	1	1	1	1	1	1	
	FACING ERROR	2	2	2	2	2	2	2	
	NO HARNESS	3	3	3	3	3	3	3	
	NO BELT	4	4	4	4	4	4	4	

ASK ALL DRIVERS:

1. Are you aware that NC has a law requiring children to be buckled up in cars? YES NO
2. Are you aware that NC has a law requiring adults to be buckled up? YES NO
3. About how far will you be driving to your next stop? _____ MILES

STATE OF CAR LICENSE: NC **OTHER:** ___ ___ **LICENSE #** _____

THANK YOU FOR TAKING THE TIME TO TALK WITH US

This survey is being done by the University of North Carolina Highway Safety Research Center in an effort to find out how people in North Carolina feel about car seats for children and seat belts for adults. As driver of the car that was stopped and given this survey, you should answer the questions. It is important that you fill out and return the survey as soon as possible. Your responses will be strictly confidential. Please be honest in your answers; we want to find out how successful publicity efforts have been and how you use car seats and seat belts. If you have any questions, call us toll-free in North Carolina at 1-800-672-4527 between 8:00-5:00 Monday-Friday. Also, you can write us at: UNC Highway Safety Research Center, CB# 3430, Chapel Hill, NC, 27599.

Please circle your answers to the questions.

1) Are you the driver of the car that was stopped by a data collector at the shopping center or day care center? **Yes** **No**

2) Are you aware that North Carolina has a law that requires children to be buckled up?

No **Yes**

a) What age children are covered by the law?

1. Under age 2 **2.** Under age 4 **3.** Under age 6 **4.** Don't know

b) At what age can seat belts be used in place of a safety seat?

1. 1 year old **2.** 3 years old **3.** 6 years old **4.** Don't know

c) Which drivers does the law effect?

1. All drivers **2.** Just parents **3.** Parents and relatives **4.** Don't know

d) What are the penalties? (Circle all that apply)

1. Warning ticket
2. 1 insurance point
3. 2 driver's license points
4. $10 fine
5. $25 fine
6. Don't know

e) How did you learn about the child restraint law? (Circle all that apply)

1. Radio
2. TV
3. Newspaper
4. Friend or relative
5. Doctor or nurse
6. Police
7. Other _____
8. Not sure, can't remember

3) Are you aware that North Carolina has a law that requires adults to be buckled up?

No **Yes**

a) Who is covered by the adult seat belt law?

1. Drivers only
2. Drivers and front seat occupants
3. All occupants
4. Don't know

b) Which vehicles are <u>not</u> covered by the law? (Circle all that apply)

1. Cars made without seat belts
2. Cars with seat belts removed
3. Cars used for short trips
4. Pickup trucks
5. Some delivery trucks
6. Don't know

c) What are the penalties? (Circle all that apply)

1. Warning ticket
2. 1 insurance point
3. 2 driver's license points
4. $10 fine
5. $25 fine
6. Don't know

d) How did you learn about the adult restraint law? (Circle all that apply)

1. Radio
2. TV
3. Newspaper
4. Friend or relative
5. Doctor or nurse
6. Police
7. Other _____
8. Not sure, can't remember

Please go to second page

Please circle your answers to the questions.

4) How often do you use car safety seats or seat belts for your child or children?

1. All of the time **2.** Most of the time **3.** About half of the time **4.** Some of the time **5.** Never

a) What are your reasons for not using safety seats or beltsfor your child(ren) all the time?

_____

_____

b) When are you most likely to buckle up your child(ren)?

_____

_____

5) How often do you use your own seatbelt?

1. All of the time **2.** Most of the time **3.** About half of the time **4.** Some of the time **5.** Never

a) What are your reasons for not using your safety belt all the time?

_____

_____

b) When are you most likely to use your own safety belt?

_____

_____

6) Do you use a safety seat for your child(ren)?

No **Yes**

a) How did you get the seat(s)?

1. Bought new **2.** Bought used **3.** Gift from a friend or relative **4.** Rented **5.** Other _____

b) Do you have instructions for the seat(s)?

1. Yes, complete **2.** Yes, a label on the seat only **3.** No, lost or thrown away **4.** No, never had them

c) Do you use the safety seat(s) just like the instructions say to?

1. Yes **2.** No **3.** Don't know

d) If not, what do you do differently? _____

_____

_____

e) Why do you use the safety seat differently? _____

_____

_____

The following questions are for research purposes only, remember all answers are confidential.

7) What is your age? _____ years

8) What is your sex? **1.** Male **2.** Female

9) What is your race? **1.** White **2.** Black **3.** Other = _____

10) What is the last grade of school you completed? (Please circle one)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

11) What is your total family income? **1.** Less than $10,000 **2.** $10,000 - 25,000 **3.** $25,000 - 40,000 **4.** More than $40,000

12) What state and county do you live in? State = _____ County = _____

Thank you very much for your help. Please return your completed questionnaire in the envelope provided. You do not need to put a stamp on this envelope. If you need to use another envelope, please send it to the address listed on the first page.