



University of North Carolina Highway Safety Research Center e-archives

access alcohol impairment bicycles
child passenger safety crashes
crosswalks data driver distraction
driver behavior engineering evaluation
graduated drivers licensing highways
injury prevention medians
motor vehicles occupant protection
older drivers pedestrians public health
research roadway design safety
school travel seat belts sidewalks
traffic transportation walking

- Hall, W.L., Lowrance, J.C., Orr, B.T., and Suttles, D.T. (1991). Comprehensive Program for Increasing Use of Safety Seats and Seat Belts for Children and Young Adults; Final Report 1991. Chapel Hill, NC: University of North Carolina Highway Safety Research Center.

Scanned and uploaded on
January 24, 2012

This report is an electronically scanned facsimile reproduced from a manuscript contained in the HSRC archives.



UNC Highway Safety Research Center

134 1/2 E. Franklin Street
CB 3430
Chapel Hill, NC 27599-3430
(919) 962-2202

North Carolina Governor's Highway Safety Program

215 E. Lane Street
Raleigh, NC 27611
(919) 733-3083

**UNC
HSRC**

GHSP

Comprehensive Program for Increasing Use of Safety Seats and Seat Belts for Children and Young Adults

**Final Report
1991**

William L. Hall
Jeffrey C. Lowrance
Beverly T. Orr
Donna T. Suttles

December, 1991
HSRC - PR 185

**COMPREHENSIVE PROGRAM FOR INCREASING USE OF SAFETY
SEATS AND SEAT BELTS FOR CHILDREN AND YOUNG ADULTS**

**FINAL REPORT
1991**

Prepared by:

**William L. Hall
Jeffrey C. Lowrance
Beverly T. Orr
Donna T. Suttles**

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

December, 1991

HSRC - PR 185

This report was funded by the North Carolina Governor's Highway Safety Program as part of project # LE-91-06-06, titled, "Comprehensive Program For Increasing Use of Safety Seats and Seat Belts for Children and Young Adults." The opinions and findings contained in this report are those of the authors and not necessarily those of the sponsor.

TABLE OF CONTENTS

	Page
LIST OF TABLES	ii
LIST OF FIGURES	iii
LIST OF APPENDICES.....	iv
ACKNOWLEDGMENTS	v
INTRODUCTION.....	1
ADVISORY, TRAINING AND COORDINATION ACTIVITIES	3
Advice and Counsel to North Carolina Safety Seat Rental Programs.....	3
Occupant Protection Training Workshops.....	5
Communications and Coordination on the State Level.....	7
Participation at State and National Conferences and Advisory Committees.....	8
PUBLIC INFORMATION AND EDUCATION EFFORTS.....	9
Distribution of Educational Materials	9
<i>Highway Safety Directions</i> Newsletter	11
Development of Public Awareness Campaigns.....	12
Child Passenger Safety Awareness Week	12
NC Lifesavers Month Activities	13
EVALUATION ACTIVITIES.....	15
Overview of North Carolina Accident Data	15
Conclusions.....	34
References	35
RECOMMENDATIONS.....	37

LIST OF TABLES

	Page
Table 1. Police Reported Restraint Usage and Fatalities for All 0-5 Year Old Occupants in North Carolina Crashes	15
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, 1981 through June 1991	22
Table 3. Casualty Benefits for Children and Youths Associated with Implementation of Restraint Laws in North Carolina, 1981 through June 1991.....	24
Table 4. Fatal Plus Serious Injury Rates for Crash Involved Children in North Carolina by Region of State, 1981 through June 1991	30
Table 5. Fatal Plus Serious Injury Rates for Crash Involved Children in North Carolina by Urban/Rural Locality, 1981 through June 1991.....	30

LIST OF FIGURES

	Page
Figure 1. Police Reported Restraint Usage Rates for Crash Involved Children, 1981 through June, 1991	17
Figure 2. Percentage of Crash Involved 0-5 Year Old Children Riding in Front Seat Versus Rear Seat, 1981 through June, 1991	17
Figure 3. Fatal plus Serious Injury Rates for Children Involved in Crashes, 1981 through June, 1991	20
Figure 4. Proportion of Restrained and Unrestrained Children in Severe (TAD Severity 4-7) Crashes, 1981 through June, 1991	27
Figure 5. Percent of Crash Involved 0-5 Year Old Children Riding in Vehicles Weighing Less than 2,500 Pounds 1981 through June, 1991	28
Figure 6. Percent of Drivers of Crash Involved 0-15 Year Old Children Charged with Driving While Impaired	32

LIST OF APPENDICES

- Appendix A. N.C. Operational Safety Seat Rental/Loaner Programs
- Appendix B. *Highway Safety Directions* Newsletter Covers
- Appendix C. North Carolina Geographical Regions

ACKNOWLEDGMENTS

The authors of this report are very grateful to have had another productive year of conducting programs in an effort to increase the use of child safety seats and safety belts for infants, children and young adults in our state. The participation in educational and promotional efforts by hundreds of local volunteers, health professionals, educators and law enforcement officers has been very gratifying. It has only been through their commitment and cooperation that our efforts have helped to promote safer transportation for children in North Carolina.

Enough credit cannot be given to the staff of the NC Governor's Highway Safety Program who collaborated in the development of and helped fund many of the programs and activities conducted throughout the year.

There are many members of the Highway Safety Research Center staff other than the authors who have assisted with the efforts of this project. Lauren Marchetti contributed valuable time and effort to most effectively promote safety seats and belts through public information and education efforts. Computer programming efforts were performed by Chris Little, Carol Martell and Eric Rodgman. Paula Hendricks has provided administrative assistance with this project as well as valuable assistance with report preparation. Other secretarial assistance was provided by Peggy James and Teresa Parks. Phyllis Alston has answered the toll-free phone line for many years and has provided information to many of the callers. In addition, she has supervised the UNC student personnel who send out the bulk of the educational materials.

INTRODUCTION

In 1977 the Highway Safety Research Center (HSRC) and the the N. C. Governor's Highway Safety Program (GHSP) began a child passenger safety education program. With the cooperation and support of the N. C. 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 diversity of programs and activities. Over the years, legislation mandating the use of restraint systems for children was enacted and later expanded. 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 N.C. Legislature. At the same time, state wide 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.

Safety seat and belt usage rates for children in accidents have increased dramatically and fatal and serious injury rates have declined. 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.

This report summarizes a year of activity and HSRC's collaboration with other state agencies, advocacy groups, and the law enforcement community to continue efforts to reduce occupant casualties among our state's infants, children and young adults. This report is focused on three areas: (1) advisory, training and coordination activities, (2) public information and education efforts, and (3) evaluation activities. Finally, recommendations for continuing and expanding these efforts in the most effective and efficient manner are made.

ADVISORY, TRAINING AND COORDINATION ACTIVITIES

The Highway Safety Research Center (HSRC) has been conducting programs in the use of safety seats and belts for children and young adults for many years. During this time, Center and project staff have gained a great amount of knowledge in the areas of programming and hardware issues and efforts are made to share this knowledge with other groups and agencies in a variety of ways.

Advice and Counsel to North Carolina Safety Seat Rental Programs

For more than a decade HSRC has focused on establishing safety seat rental programs across the State and providing advice and counsel to existing programs. These programs target parents in the lower socio-economic income level by offering seats at low cost to families who cannot afford to purchase a seat on their own. Most of these rental programs are based in county health departments and offer infant and convertible safety seats to county residents. Hospital based programs have large inventories of infant car seats that are rented to parents of babies born in their hospital. There are also a small number of programs operated by local service groups, clubs, the Red Cross, and police departments.

Grants from the Department of Environment, Health, and Natural Resources, Injury Control Section to local health departments provided funding to rejuvenate or expand programs to educate parents about the correct use of car seats and the importance of motor vehicle occupant protection for the whole family. Renting or selling child safety seats is usually a component of these programs. HSRC became heavily involved in implementing these programs through, (1) training health educators how to teach parents to properly use car safety seats, (2) advising on bulk purchase of seats, and (3) providing guidelines on how to set up and maintain an effective program.

In addition to the Occupant Protection Training Workshops offered to health professionals and volunteers interested or involved in rental programs, much of the communication to rental program contacts was through HSRC's toll free phone line. The toll free number is printed on all of HSRC's bulk handouts and

information sheets. Rental program operators are encouraged to call HSRC when they (1) are unable to answer a parent's question, (2) have a question about a rental seat or a used seat that a parent has asked them to determine if it is safe to use, (3) need the latest child passenger safety information/fact sheets/audio visuals, etc. for use in their program or for any planned activities, (4) want to discuss problems or frustrations they are having in operating their program, and (5) need training for new employees and/or volunteers who will be involved in renting out seats.

Many of the toll free telephone calls from rental programs dealt with topics mentioned above. The most prevalent questions from health educators involved advice for counselling parents on which type of car seat to use as well as when and how to use it. Typical questions asked were: When should the orientation of the car seat change from rear-to-forward facing? How long should a child stay in a forward-facing seat? When should a child be placed in a booster seat or behind a seat belt? Telephone calls generally resulted in the mail out of a packet of child passenger safety information to the inquirer. Rental program operators were strongly urged to copy and distribute the question and answer reference sheets provided in the packet and to order items available in bulk from the N.C. Governor's Highway Safety Program office.

All rental programs continue to receive HSRC's newsletter, "Directions" that provides updated safety related information. If the contact person is a member of the N. C. Passenger Safety Association, the program also received the Association's "Beltline" newsletter to keep them informed about passenger safety activities across the state. Groups inquiring about setting up a rental program were sent, "A Guide for Establishing a Car Safety Seat Rental Program," which provides step by step instructions and training information.

There continues to be an upward trend in programs converting from "rental" to the "sale" of safety seats at near wholesale cost. Some programs are opting for renting out infant car carriers only and selling convertible seats to parents upon return of the infant seat. These programs continue to instruct parents in the proper use of the safety seat whether it is rented or purchased.

"Sale" programs are equally important to the local community in that they provide a critical need to families who cannot purchase a seat at full price, or perhaps would not be inclined to purchase a seat without the encouragement of trained health professionals or dedicated volunteers. In fiscal year 1992, HSRC plans to conduct a survey to identify these programs and offer them the same kind of support provided to existing rental programs.

Currently there are approximately 92 existing programs with an inventory of over 9200 seats available for rental. HSRC last surveyed existing rental programs in the fall of 1989. HSRC's rental program listing generated from the survey has been utilized extensively to assist parents in locating rental programs in their county. The program listing is updated throughout the year as information is received from program contacts or word of mouth. No program is under contractual commitment to provide updates so HSRC. The list of rental programs and their inventories in Appendix A should be considered as an approximate count.

As part of a N. C. Governor's Highway Safety Program grant to the N. C. DEHNR, Injury Control Section, a survey of county health departments was initiated in the late summer of 1991 to ascertain the number of rental programs in each county. The final survey results will be available by the fall of 1991 and plans are under way to work with ICS to blend and verify both ICS and HSRC records.

Occupant Protection Training Workshops

HSRC continues to stress the importance of training for all volunteers and professionals involved in rental programs in order to assure that parents are provided accurate instruction and to reduce program liability. Additionally, HSRC strives to increase the pool of volunteers and professionals who would advocate the proper use of child safety seats and seat belts at the local level through a variety of activities such as conducting education programs, distributing highway safety literature, and conducting safety seat/belt proper use installation clinics.

Occupant Protection Training Workshops for highway safety and health professionals along with volunteers are conducted on a monthly (or as needed) basis

at the Highway Safety Research Center facilities in Chapel Hill. Each workshop is adapted to the needs of the participants. The one-day workshop agenda includes a core segment that provides accurate and up-to-date information related to car crashes and restraint use, the effectiveness of restraint systems and occupant restraint laws in reducing motor vehicle related death and injury, and the correct use of child safety seats and safety belts.

Participants learn about the different types of safety seats and belts, how to properly use them, and of the consequences when they are used improperly. Resource information is provided to enable the participants to serve as knowledgeable educators within their own programs and communities. As necessary, concurrent break-out sessions follow the core segment of the workshop. One session provides training for those interested or involved in conducting safety seat rental programs and the other is for those who wish to be trained to conduct a safety seat/belt proper use installation clinic. Those participants attending the breakout session on installation clinics receive hands-on experience working with safety seats and seat belts by going to a local day care center to watch and participate in a safety seat check clinic conducted by the workshop instructors.

HSRC staff conducted the following Occupant Protection Training Workshops during the grant period:

<u>Date</u>	<u>Location</u>	<u>Group Represented</u>	<u># Attendees</u>
11/9	Chapel Hill	Rowan County Health Department	2
		Randolph County Health Department	2
		Allegheny County Health Department	1
02/19	Chapel Hill	Stokes County Health Department	1
		Surry County Health Department	1
		Boon Trail Medical Center (Harnett County)	1
06/11	Chapel Hill	Greensboro Junior Luv Buckles	1
		Richmond County Health Department	4
		Sampson County Health Department	2
06/26	Chapel Hill	Alleghany County Health Department	2
		Lincoln County Health Department	2
09/27	Chapel Hill	Pender County Health Department	1
		Orange County Health Department	2

Communications and Coordination on the State Level

There are now three organizations within North Carolina that conduct programs and activities related to occupant protection. The NC Governor's Highway Safety Program, and the NC Passenger Safety Association conduct these activities along with the UNC Highway Safety Research Center. A fourth organization, Seat Belts for Safety, Inc. had been a major factor in promoting the Seat Belt Law but has been dissolved with their materials being turned over in large part to GHSP. It is important that these organizations maintain communications among themselves and coordinate activities so that the limited funds and personnel that are available are used in the most efficient and effective manner possible. Representatives of these organizations met several times during the project year to discuss and plan major educational and promotional campaigns, and to divide up tasks and funding responsibilities. Routine communications among the groups also helped to keep others apprised of everyone else's activities and reduce duplication of effort, and to develop as comprehensive of a program as possible.

The NCPSA was formed in 1982, and since that time HSRC has advised and provided administrative support to the organization. This past year the Executive Director to the Association continued to be an HSRC staff member, however, this person resigned from that position after the annual conference and will serve only in a liaison/consultant role in future NCPSA activities. Because NCPSA sponsors several projects throughout the year and sometimes solicits the technical expertise and suggestions of both HSRC and GHSP in implementing activities, it was felt that HSRC should continue to provide help and assistance in conducting activities as well as representation at NCPSA Board meetings.

NCPSA further strengthens its involvement in the state's occupant protection plans and programs conducted by HSRC and other state agencies by assisting them in administering occupant protection projects. In addition, NCPSA members are often asked to serve as members of advisory panels or consultants for specific activities. NCPSA is also represented at planning meetings attended by GHSP and HSRC staff to coordinate activities and communicate plans.

During this grant period, NCPSA participated in several activities. NCPSA coordinated plans for manning a booth at the State Fair in October 1990 to distribute educational and promotional materials. NCPSA worked with HSRC and GHSP to plan and implement activities for Child Passenger Safety Awareness Week in February.

Participation at State and National Conferences and Advisory Committees

In an effort to keep abreast of programs and activities being conducted across the United States as well as within North Carolina and to share North Carolina's programs and experiences, HSRC staff members attend relevant conferences whenever possible. During this project year, HSRC staff attended, participated in and assisted as volunteers for the National Lifesavers 9 Conference held in Charlotte.

HSRC project staff also participated in several national advisory boards during this quarter:

- Advisory committee to the National Safe Kids Campaign to develop a national strategy/campaign related to child passenger safety.
- Advisory committee to plan for the national Child Passenger Safety Conference to be held in Charlotte.
- Advisory committee to plan for the national Youth Traffic Safety Conference to be held in Charlotte.
- Panel that performed an assessment of the State of Virginia's occupant protection program. During this process, information was obtained on successful PI&E programs that may be of value in North Carolina.

PUBLIC INFORMATION AND EDUCATION EFFORTS

North Carolina is very similar to the rest of the nation in that the use of restraint devices for children in cars has become the accepted norm rather than the exception, but at the same time, many parents and others who transport children find this subject very confusing. Thus, the distribution of educational materials and dissemination of information related to child safety seats and belts has been a focal point of this project in an attempt to provide accurate and readily accessible information. North Carolina also has the problem that many parents do not use restraint devices that are appropriate for the size of their child and there still continues to be a minority of drivers who do not buckle their children at all. These problems have all been addressed through this project in a number of ways.

Distribution of Educational Materials

HSRC continued to be a major source of information on highway safety in general and occupant protection in particular for the State of North Carolina and to some degree the United States. For the most part, materials developed and produced by HSRC are distributed free of charge to North Carolina residents.

Growing Up Buckled Up is the brochure developed in 1985 to provide parents with general information on the Child Passenger Safety and Seat Belt Laws as well as basic information on the use of safety seats and belts for children. This brochure, revised during FY88 to present more information on the two laws and updated information on recommendations for the use of seat belts by children was widely distributed during this project year with approximately 50,000 copies printed for distribution to North Carolina residents through GHSP.

While *Growing Up Buckled Up* is the only brochure provided in bulk, HSRC maintains a supply of other informational handouts that provide more detailed information on a variety of issues related to safety seats and belts. Many of the informational sheets were developed by project staff while others are reprints of materials developed by others. A number of these information sheets were updated and re-designed during this reporting year. These handouts are one or two page

reproducible handouts, provided with the intent that local programs will make as many copies as they need. Topics included through these handouts include a safety seat shopping guide, commonly asked questions about the Child Passenger Safety and Seat Belt Laws, safety seat recalls, car pool safety tips, guide to purchasing used safety seats, restraint options for older children, child seat use with automatic seat belt systems, and questions and answers about air bags and automatic seat belts.

HSRC continues to maintain a collection of films and videotapes related to occupant protection that are available on a loan basis to North Carolina residents. These programs are a valuable resource for health professionals, teachers, and other health and safety advocates who are making presentations within their own communities or who want to preview programs that are available. During this project year, 97 films and videotapes were loaned to schools, police departments and health professionals and other highway safety advocates throughout the state.

One of the most efficient means for the dissemination of timely information is through the *Highway Safety Directions* newsletter that is partially funded under this project. Directions is sent to a mailing list of over 3,700 addresses, including all North Carolina law enforcement agencies, health department directors and health educators, rental program coordinators and NC Passenger Safety Association members. New or revised informational handouts are published in *Directions* with the intent that they will be reproduced for distribution at the local level. The *Directions* mailing list also contains approximately 1000 out-of state and 140 foreign addresses, therefore reports of North Carolina activities and research results and informational handouts are distributed across the country and in fact internationally. The NCPSA publishes its own quarterly newsletter, *Carolina Belt Line* with limited administrative support from HSRC. *Carolina Belt Line* reports on Association activities, regional and community activities, research findings and other information that may be useful to members.

HSRC's toll-free phone line continues to be a valuable resource of information for North Carolina residents. This service is available to anyone in North Carolina to ask questions pertaining to safety seats or seat belts or to request

educational materials or audiovisuals. Most of the calls received through this line come from concerned parents who want information on NC's Child Passenger Safety Law, what is the "best" safety seat to buy, when they can or should move their children out of the safety seat into a booster seat or seat belt, solving car pooling problems, etc. Many people also call in with questions about seat belts for adults and the Seat Belt Law. This line also serves as a means for local programs to contact HSRC with requests for materials, information, or assistance with problems. During this project year, HSRC staff spent a total of 273 hours (or over 34 working days) responding to North Carolina citizens through this line. In addition, countless hours were spent by HSRC staff responding to call and providing advice or materials for out-of-state callers.

Highway Safety Directions Newsletter

Under the 1986-87 grant, HSRC merged the *Totline* and *Highway Safety Highlights* newsletters into one -- *Highway Safety Directions*. *Highway Safety Directions* covers passenger safety and general highway safety issues and profiles research being conducted at HSRC. The merger combined the mailing lists of the two previous publications and included the addition of other groups and agencies to the list.

The first issue of *Directions*, produced under the 1986-87 grant, went out November 1987. Since then, HSRC staff have produced and mailed 10 other issues. Two issues went out during this reporting year (copies of covers included as Appendix B). A third issue is scheduled for distribution in December.

The first issue, Spring 1991, featured articles looking at a GHSP/HSRC rural community seat belt program, emerging trends in injuries to child passengers, the start of a statewide program to educate the public about automatic seat belts and air bags, and a DWI program taking place in Wilmington and New Hanover County.

The rural community program article reported the successes seen in Bertie County where seat belt use has increased dramatically. The child passenger protection story reported research results indicating that deaths and serious injuries to children in automobiles have declined during the last several years. The

Wilmington DWI article told how a local program is using posters and public service announcements to emphasize the high costs of auto insurance after a DWI conviction.

The second issue, Summer 1991, served as the Center's periodic publications guide. This issue listed HSRC publications available through the Center's library. Reports and articles listed fell under several different categories, including Accident Analysis, Alcohol and Highway Safety, Child Passenger Safety, Driver Studies, Roadway Research, Safety Belts, and Trucks. The Child Passenger Safety section listed three different publications, while the Safety Belts sections included nine.

Overall, both issues have received favorable responses with inquiries from the media and requests from agencies, groups and persons for further information or permission to copy and distribute articles. The Fall 1991 issue is scheduled for completion and distribution in December.

Development of Public Awareness Campaigns

During this project year, HSRC teamed up with other organizations to conduct two public awareness campaigns. These campaigns represent efforts to reach the largest audiences possible with limited personnel and funds. The basic premise behind all of these efforts is to encourage groups and individuals to conduct activities and disseminate occupant protection information in their own communities.

Child Passenger Safety Awareness Week

HSRC staff worked with the UNC News Bureau to prepare a news release that was sent out to the NC press for Child Passenger Safety Awareness Week in February.

For this year's National and North Carolina Child Passenger Safety Awareness Week in February, HSRC worked with the GHSP and the NCPSA to carry out a "Saved by the Safety Seat" award program. All NC law enforcement agencies were asked to identify local children who were saved from serious injury

or death in a crash because of being in a safety seat. HSRC produced specially designed "Saved by the Safety Seat" award certificates for this program. One version was produced for local police departments and another version was produced for the State Highway Patrol. HSRC prepared and coordinated the mailing of packets explaining the program to law enforcement agencies along with a supply of certificates for their use. GHSP and NCPA assisted in the funding for printing of the certificates and postage for distribution of the packets. Feedback from agencies was very positive with many agencies indicating that they had used the certificates during this time or would be using them in the future.

NC Lifesavers Month Activities

For the fifth consecutive year, Governor Martin, proclaimed the month of May as Lifesavers Month in North Carolina. Governor Martin and GHSP chose May because it is the traditional start of the summer vacation and travel season and to coincide with National Buckle Up America Week. Therefore, May comes as a good time to remind the motoring public of the importance of using safety belts and child seats, obeying speed limits and driving sober.

For the past several years, the North Carolina Lifesavers Conference has been conducted as a part of the Lifesavers Month activities. However, this past year the National Lifesavers Conference held May 12-15 was hosted by the State of North Carolina. The Governor's Highway Safety Program along with many other highway safety agencies and organizations co-sponsored this conference. Since this was the first time this conference was held in our state, and in order to provide an opportunity for as many individuals as could to attend this conference, it was decided not to conduct the North Carolina conference and to focus efforts on assisting the GHSP with the many responsibilities associated with conducting such a conference. Both the HSRC and NCPA supplied staff and volunteers to assist with registration, workshops, hospitality, etc. The NCPA sponsored a hospitality room each night of the conference and also conducted its annual business meeting during the conference to elect officers, present awards, etc. Over one hundred individuals from across the state attended this occupant protection/alcohol conference to

exchange ideas and program activities with other participants from across the country.

GHSP, HSRC and NCPSA further participated in NC Lifesavers Month by developing, printing, and distributing quantities of Save by the Belt Awards to all police and sheriff departments and all highway patrol headquarters in the state. These agencies were encouraged to give these awards to deserving crash survivors in their local areas. The agencies were also encouraged to contact their local media organizations to publicize and broadcast the presentation of the awards.

EVALUATION ACTIVITIES

The NC Governor's Highway Safety Program has been funding 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. Educational activities and especially legislation have had a tremendous impact on child transportation safety in North Carolina.

Overview of North Carolina Accident Data

Table 1 presents an overview of the restraint and fatality status of children involved in North Carolina car crashes during the past 15 years.

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

<u>Year</u>	<u>% Restrained</u>	<u># Killed</u>	<u># Unrestrained</u>	<u># Restrained</u>
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
1989	87.2	33	28	5
1990	88.3	13	08	5

Beginning in 1979, after educational efforts were begun, 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 children less than age six. This legislative activity was associated with the largest increase in usage rates.

A quick glance at the fatality figures in Table 1 could bring about questions about the benefits, or lack thereof, of increased restraint usage. With the exception of 1990, as many or more children have been killed in recent of years, with reported restraint usage at a high level, as were killed in earlier years with restraint usage very low. It is clear from an examination of the accident reports that the vast majority of these children who were killed were not restrained at the time of the crash with many of the deaths being due to ejection, deaths that almost certainly would not have occurred if the children had been secured in restraint systems.

Another aspect to note is the number of children who have been killed while restrained. Concern over this trend 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 police-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 over 90 percent from July 1990 through June 1991. While the reported usage rate for 2-5 year olds also increased substantially (from 8% to 87%) 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.

Figure 1. Police Reported Restraint Usage Rates for Crash Involved Children, 1981 through June 1991.

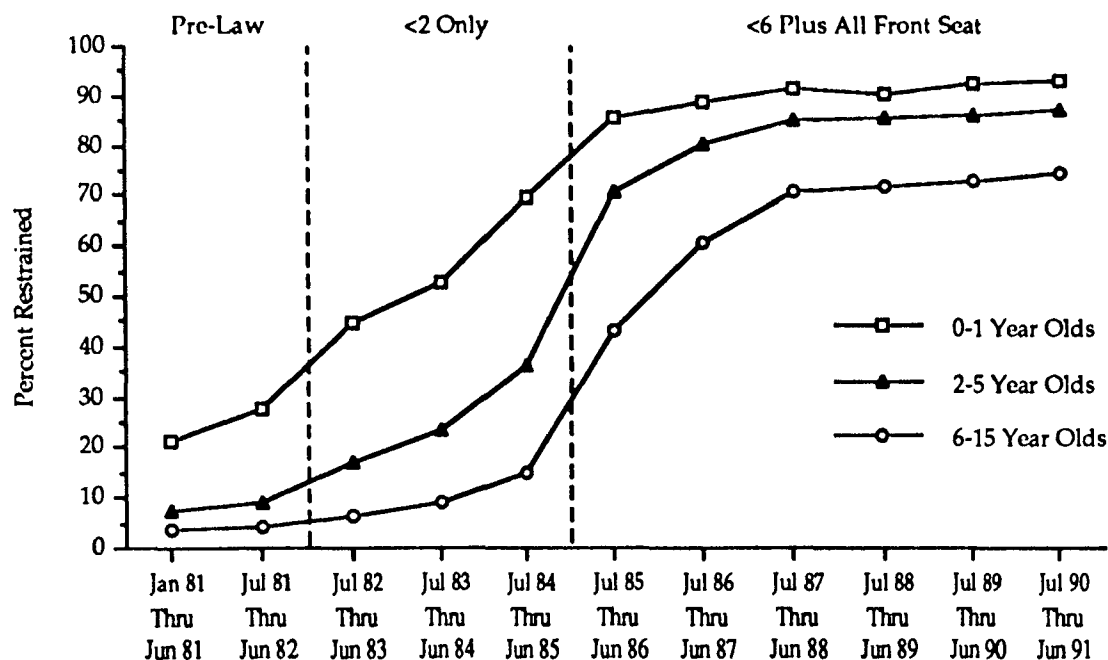
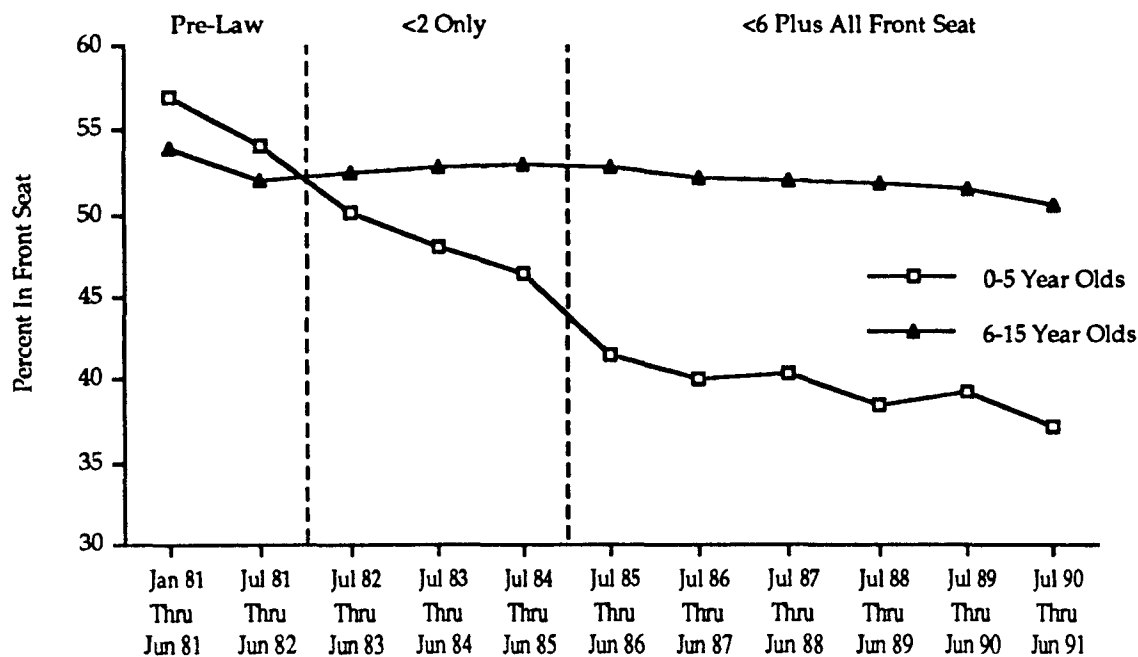


Figure 2. Percent of Crash Involved 0-15 Year Old Children Riding in Front Seat, 1981 through June 1991.



Reported restraint usage rates for these children (from 4% prior to 1982 to 75% in 1991) 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, and North Carolina data in particular, 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 1991 and June 1992 only 37 percent of the children were in the front seat and 63 percent were being transported in generally safer rear seating positions. This same trend has not occurred among the 6-15 year olds for whom the level of rear seat positioning has increased from 46 to 49 percent during this time period. The North Carolina data shows that the percent of children who are seriously injured or killed is consistently larger than that for the rear seat. Even without increasing the percentage of 6-15 year olds who buckle up, reductions in deaths and serious injuries to this age group could be realized by encouraging more rear seat travel.

Before proceeding any further in analyses of these accident data, mention 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.

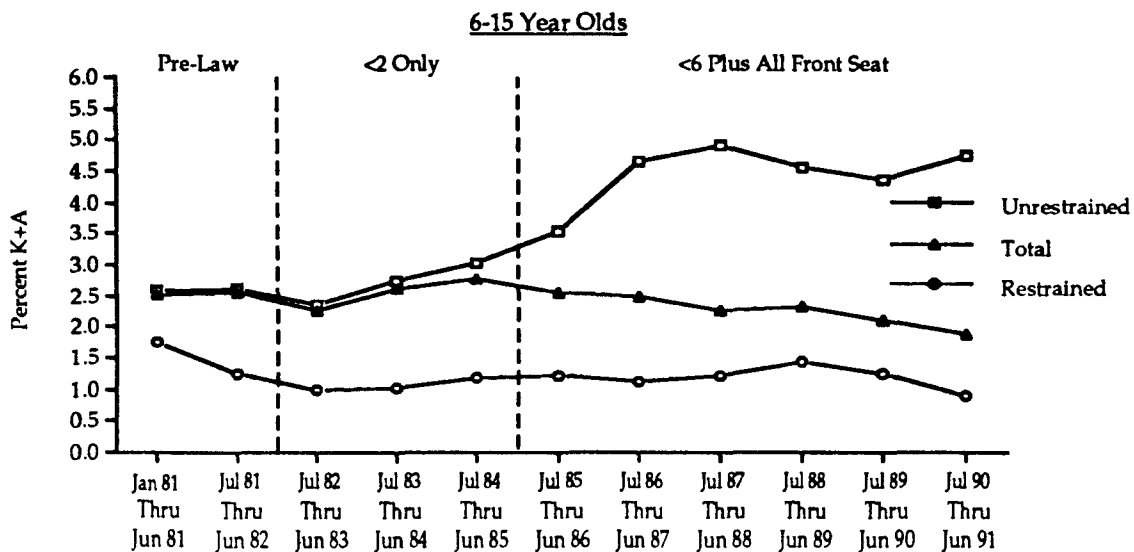
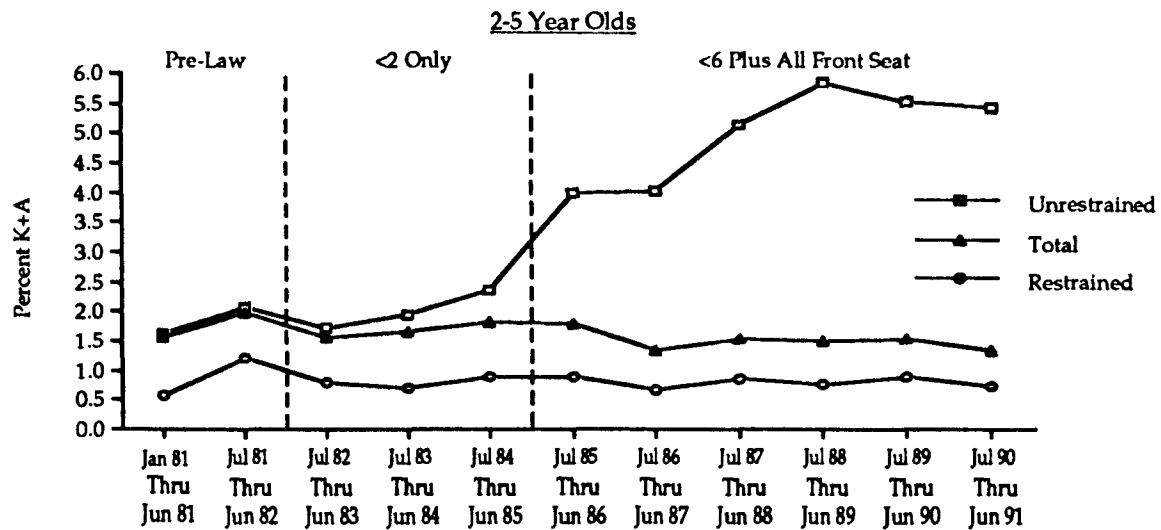
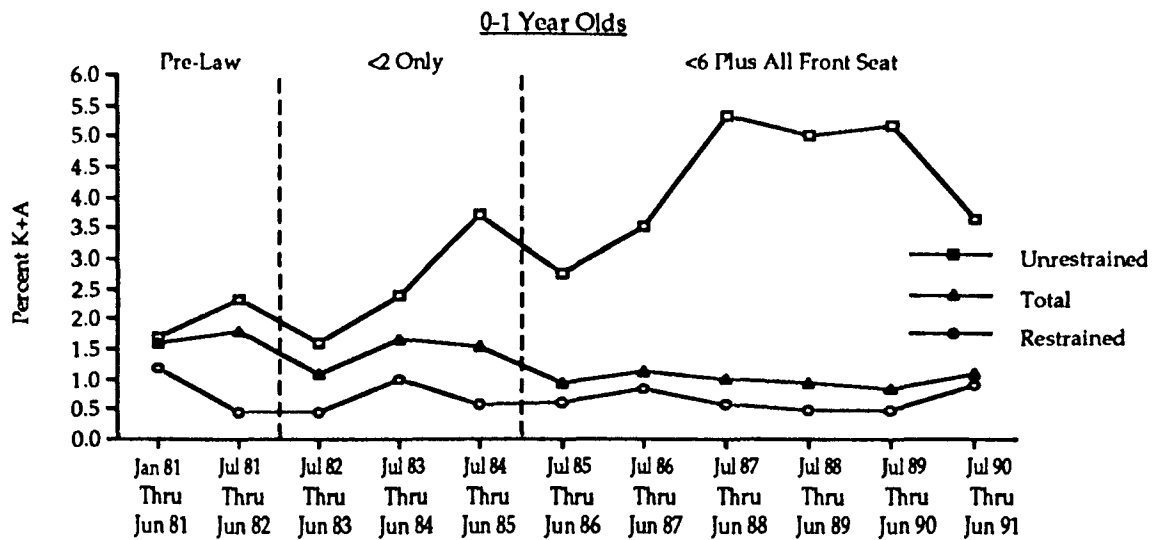
Previous comparisons of observed restraint usage rates for children and reported usage rates from the accident data appears to indicate that as children grow

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. Observational surveys conducted for North Carolina in 1989 found that 72 percent of the 0-5 year old children were restrained (Hall, et. al, 1989). This figure itself is well below the 86 percent usage rate derived from 1989 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 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.

Figure 3 shows the fatal plus serious injury (K+A) rates for children in the 0-1, 2-5, and 6-15 age groups since 1981. For all age groups, the K+A rates for children reported to be unrestrained have been increasing across time by a factor of 70 to over 200 percent. At the same time, the K+A rate for the children reported to have been restrained has remained steady or increased only slightly across time

Figure 3. Fatal and Serious Injury Rates for 0-15 Year Old Children Involved in Crashes, 1981 through June 1991.



(with any increases 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). 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.

Table 2 shows the actual fatal and serious injury rates and the injury and population figures used to calculate the 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, drivers and front seat occupants of any age have been required to be buckled up since October 1985.

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

Table 2. Average Fatal Plus Serious Injury (K+A) Rates and Percent Change for Children <16 Associated With NC Child Passenger Protection and Seat Belt Legislation, 1981 through June 1991.

		(A) PRE-LAW			(B) <2 CPS LAW				(C) <6 CPS LAW & SEAT BELT LAW										
		Jan 81 Thru Jun 81	Jul 81 Thru Jun 82	Total	Jul 82 Thru Jun 83	Jul 83 Thru Jun 84	Jul 84 Thru Jun 85	Total	Jul 85 Thru Jun 86	Jul 86 Thru Jun 87	Jul 87 Thru Jun 88	Jul 88 Thru Jun 89	Jul 89 Thru Jun 90	Jul 90 Thru Jun 91	Total				
AGE	# K+A	20	45	65	30	35	42	107	33	34	31	33	29	39	199	PERCENT CHANGE			
0-1	Total #	1221	2514	3735	2553	2133	2701	7387	3337	2895	3046	3429	3458	3256	19421	(A)>(B)	(B)>(C)	(A)>(C)	
	% K+A	1.64	1.79	1.74	1.18	1.64	1.55	1.45	0.99	1.17	1.02	0.96	0.84	1.20	1.02	-16.7	-29.7	-41.4	
	# K+A	75	205	280	169	183	214	566	213	178	213	225	233	179	1241				
2-5	Total #	4729	10204	14933	10671	10926	11290	32887	11798	12782	13479	14266	14544	13188	80067				
	% K+A	1.59	2.01	1.88	1.58	1.67	1.90	1.72	1.81	1.39	1.58	1.58	1.60	1.36	1.55	-8.5	-9.9	-17.6	
	# K+A	95	250	345	199	218	256	673	246	212	244	258	262	218	1440				
0-5	Total #	5950	12718	18668	13224	13059	13991	40294	15135	15677	16525	17695	18012	16444	99488				
	% K+A	1.60	1.97	1.85	1.50	1.67	1.83	1.67	1.63	1.35	1.48	1.46	1.45	1.33	1.45	-9.7	-13.2	-21.6	
	# K+A	295	660	955	604	697	780	2081	719	789	737	774	710	564	4293				
6-15	Total #	11335	25269	36604	25928	26145	27206	79279	27737	30356	30473	31024	31602	28126	179318				
	% K+A	2.60	2.61	2.61	2.33	2.67	2.87	2.62	2.59	2.60	2.42	2.49	2.25	2.01	2.39	+0.4	-8.8	-8.4	

they became covered by the CPS Law during the third time period, their K+A rates was reduced another 9 percent to 1.55. The total reduction in the K+A rate for the 2-5 year olds was 18 percent (from 1.88 to 1.55) 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 small (.4%) increase in the K+A rate between the first and second time periods. There was, however, a 9 percent decrease between the second and third time periods after they became subject to the Seat Belt Law with most of this decrease coming after January, 1987 when the full penalty phase of the seat belt law went into effect.

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. This expected number is then compared to the actual number of K+A injuries seen in that time

Table 3. Casualty Benefits for Children and Youths Associated With Implementation of Restraint Laws in North Carolina, 1981 through June 1991.

Age	Jan 81 - June 82	July 82 - June 85				July 85 - June 91				July 82 - June 91
	Percent K+A	Number Involved	Expected K+A	Actual K+A	= K+A Benefit (% Change)	Number Involved	Expected K+A	Actual K+A	= K+A Benefit (% Change)	K+A Benefit (% Change)
0-1	1.74	7387	129	107	-22 (-17.1%)	19421	338	199	-139 (-41.1%)	-161 (-34.5%)
2-5	1.88	32887	618	566	-52 (-8.4%)	80067	1505	1241	-264 (-17.5%)	-316 (-14.9%)
0-5	1.85	40274	747	673	-74 (-9.9%)	99488	1840	1440	-400 (-21.7%)	-474 (-18.3%)
6-15	2.61	79279	2069	2081	+12 (+0.6%)	179318	4680	4293	-387 (-8.3%)	-375 (-5.6%)

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 killed or seriously injured during the time ($.0174 \times 7387 = 128.5$). 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 four years (July 85 - June 91), there was a 41 percent reduction in K+A injuries of 139. Overall, there has been a 35 percent benefit, which can be translated as 161 0-1 year old children saved from K+A injuries, since the original CPS Law was implemented in July 1982.

Among the 2-5 year olds, there has been a 15 percent reduction of 316 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 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. 17.5% 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 8.3 percent benefit associated with the actual number of K+A injuries seen in the July 85 - June 91 period (4293) when compared to the expected number (4680) based on the 2.61 K+A rate for the first time period. There was an overall reduction of 375 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. Involvement figures from Table 2 indicate that in the January 1981 - June 1982 period, 18,668 children between ages of 0-5 were involved

in N.C. car crashes for an average of 12,445 per year. In the July 1982 - June 1985 period, however, an average of 13,425 children were involved each year and this yearly average increased to 16,581 during the July 1985 - June 1991 period. This means that many more children are exposed each year to car crashes and potential injuries and even greater reductions in injury rates will be needed to reduce actual numbers.

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

Figure 4. Proportion of Restrained and Unrestrained 0-15 Year Old Children in Severe (TAD Severity 4-7) Crashes, 1981 through June 1991.

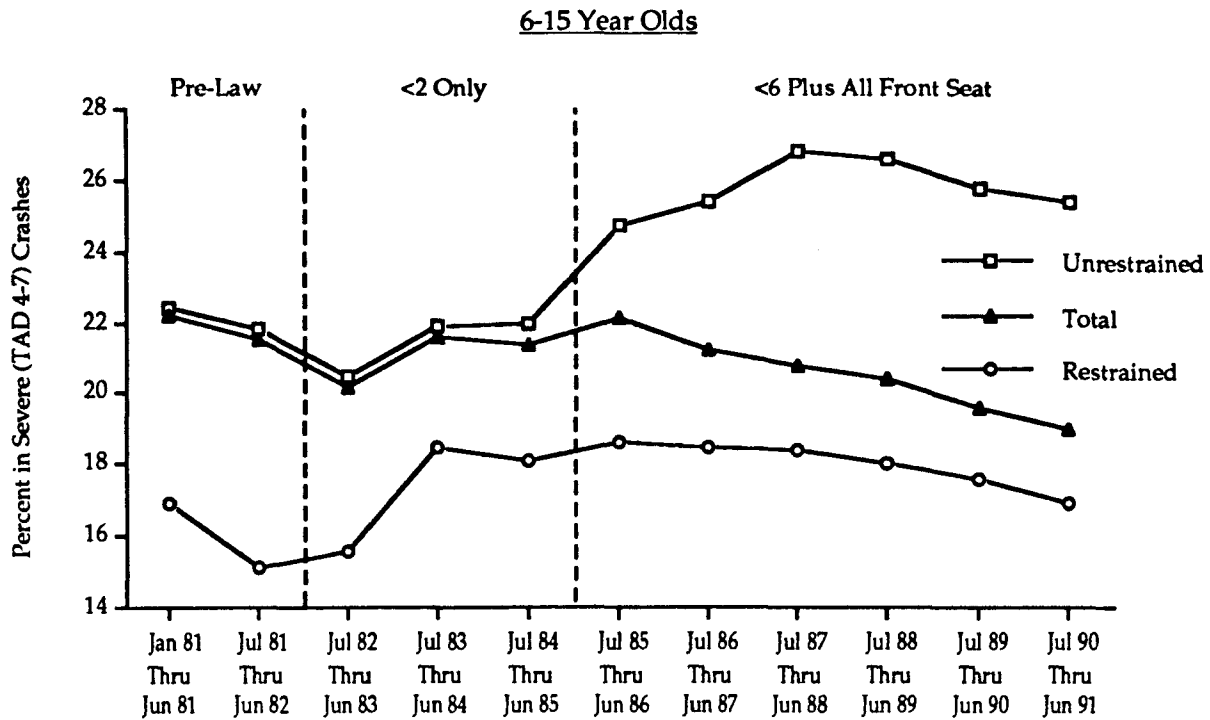
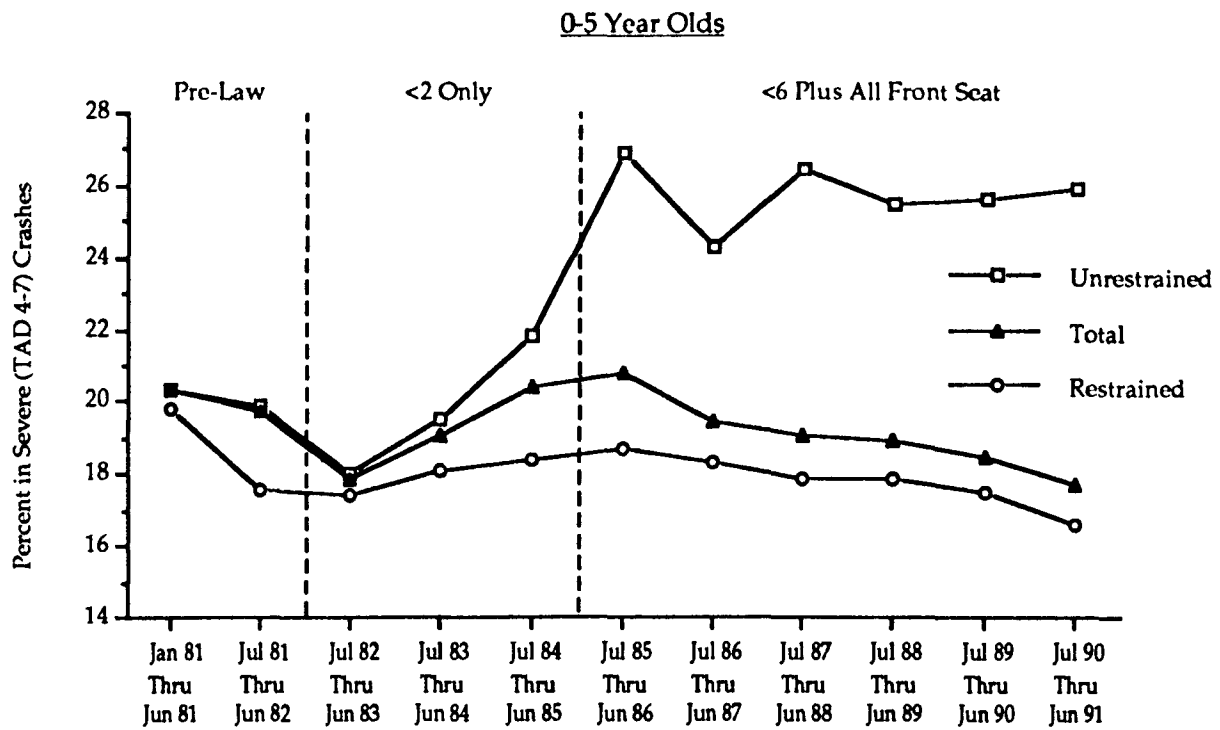
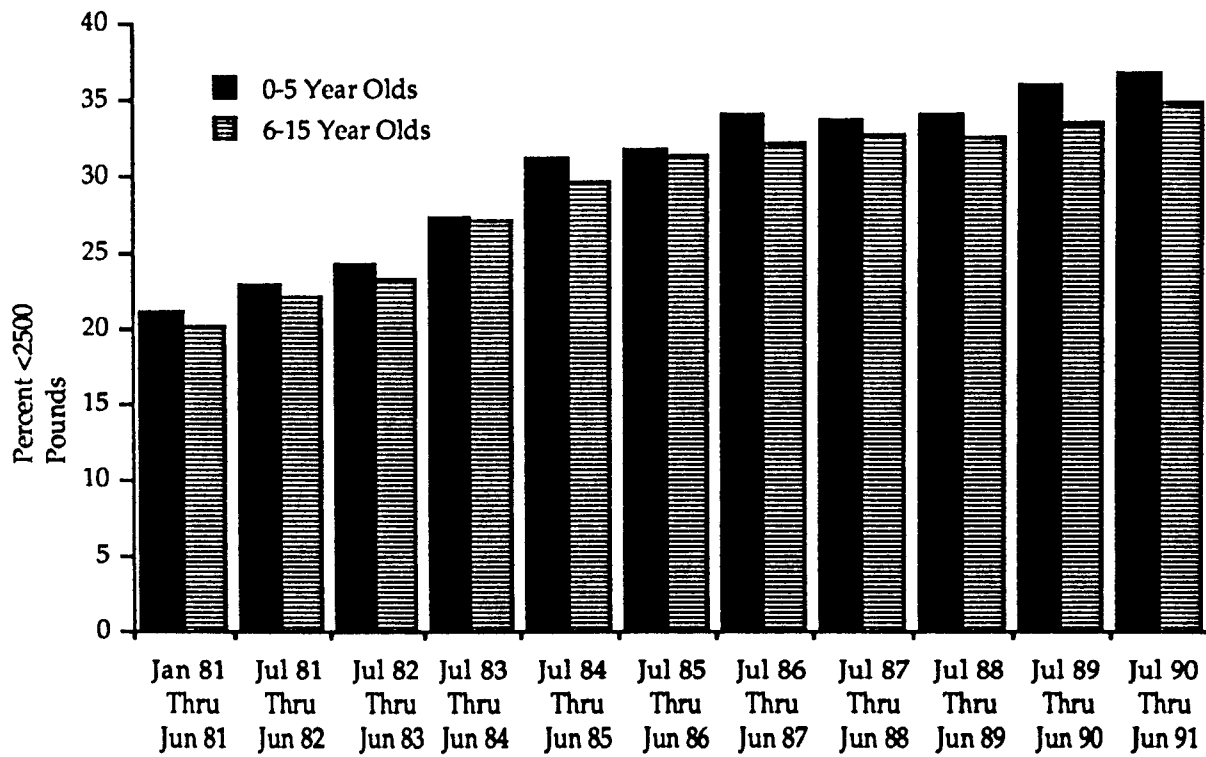


Figure 5. Percent of Crash Involved 0-15 Year Old Children in Vehicles <2500 Pounds, 1981 through June 1991.



to about 35 percent for the last year, 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.

A look at other factors provides additional areas where improvements in child passenger safety can be made to help reduce deaths and injuries further. Table 4 presents K+A rates for North Carolina by region of the state. Appendix C indicates the counties that have been included in the West, Central and East regions. As Table 4 indicates, the Central region has the lowest, and the West has the highest, total K+A rate for both the 0-5 and the 6-15 year olds. For the 0-5 year olds, both the Central region has shown an appreciable decline of one-third in K+A injuries over the three legislative periods. The rate for the West has been reduced by only 8 percent and for the East by 4 percent. For the 6-15 year olds, the K+A rate for the West has actually increased during this time. While these rates have been reduced for the Central and East, the reductions have been rather modest. Statewide seat belt surveys have shown that belt wearing rates for drivers and front seat passengers are highest in the Central region with the West being the lowest (Reinfurt, et al, 1990). If the assumption is made that the patterns for restraining children are the same as for drivers and front seat occupants, this would mean that fewer children and youths are buckled in the West and East than in the Central region. The injury rates in Table 4 would seem to reflect such a pattern.

Table 5 indicates how K+A rates vary by urban/rural localities. As would be expected due to generally higher speeds and greater distances from medical treatment, K+A injury rates are highest in rural (<30% developed) localities for both the younger and older children. As would also be expected, due to generally lower speeds and shorter distances from medical treatment, the rates are lowest in the

Table 4. Fatal Plus Serious Injury Rates for Crash Involved Children in North Carolina by Region of State, 1981 through June 1991.

Region	0-5 Year Olds				6-15 Year Olds			
	Jan81- Jun82	Jul82- Jun85	Jul85- Jun91	Total	Jan81- Jun82	Jul82- Jun85	Jul85- Jun91	Total
West	1.90 * (14.7)**	2.08 (13.8)	1.74 (13.5)	1.85 (13.7)	2.86 (16.7)	3.14 (15.8)	3.33 (15.1)	3.21 (15.6)
Central	1.89 (53.6)	1.51 (56.0)	1.25 (56.0)	1.39 (55.2)	2.52 (54.6)	2.42 (55.3)	2.13 (55.3)	2.26 (55.2)
East	1.75 (31.7)	1.77 (31.5)	1.68 (30.7)	1.71 (31.1)	2.63 (28.8)	2.73 (29.0)	2.40 (29.6)	2.52 (29.3)

* Percent K+A injuries

** Percent of total occupants for each time period in each region

Table 5. Fatal Plus Serious Injury Rates for Crash Involved Children in North Carolina by Urban/Rural Locality, 1981 through June 1991.

Locality	0-5 Year Olds				6-15 Year Olds			
	Jan81- Jun82	Jul82- Jun85	Jul85- Jun91	Total	Jan81- Jun82	Jul82- Jun85	Jul85- Jun91	Total
Rural	3.02 * (26.4)**	2.79 (27.1)	2.57 (25.0)	2.68 (25.7)	3.99 (30.3)	4.16 (29.9)	4.03 (29.9)	4.06 (29.0)
Mixed	1.87 (21.6)	1.72 (19.7)	1.60 (18.3)	1.67 (19.0)	2.45 (22.0)	2.68 (20.0)	2.54 (20.0)	2.57 (19.5)
Urban	1.25 (52.0)	1.08 (53.3)	0.91 (56.8)	0.99 (55.3)	1.81 (47.8)	1.69 (50.1)	1.47 (50.1)	1.56 (51.5)

Rural = <30% Developed, Mixed = 30% - 70% developed, Urban = >70% Developed

* Percent K+A injuries ** Percent of total occupants for each time period in each locality

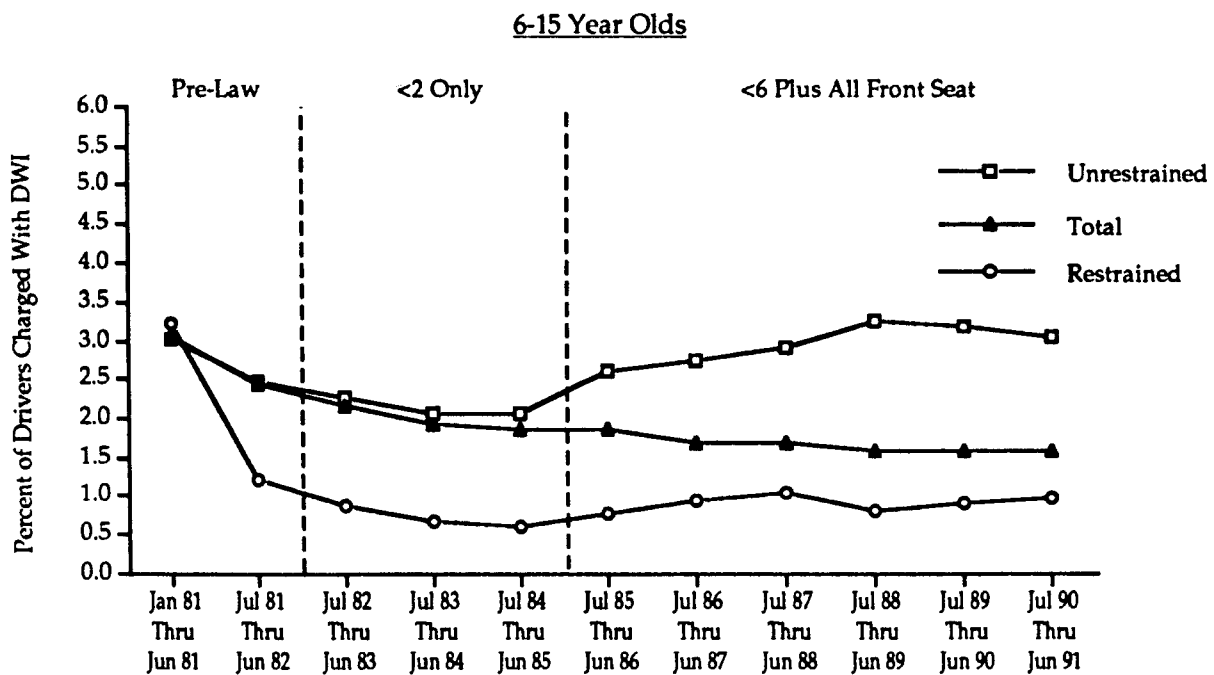
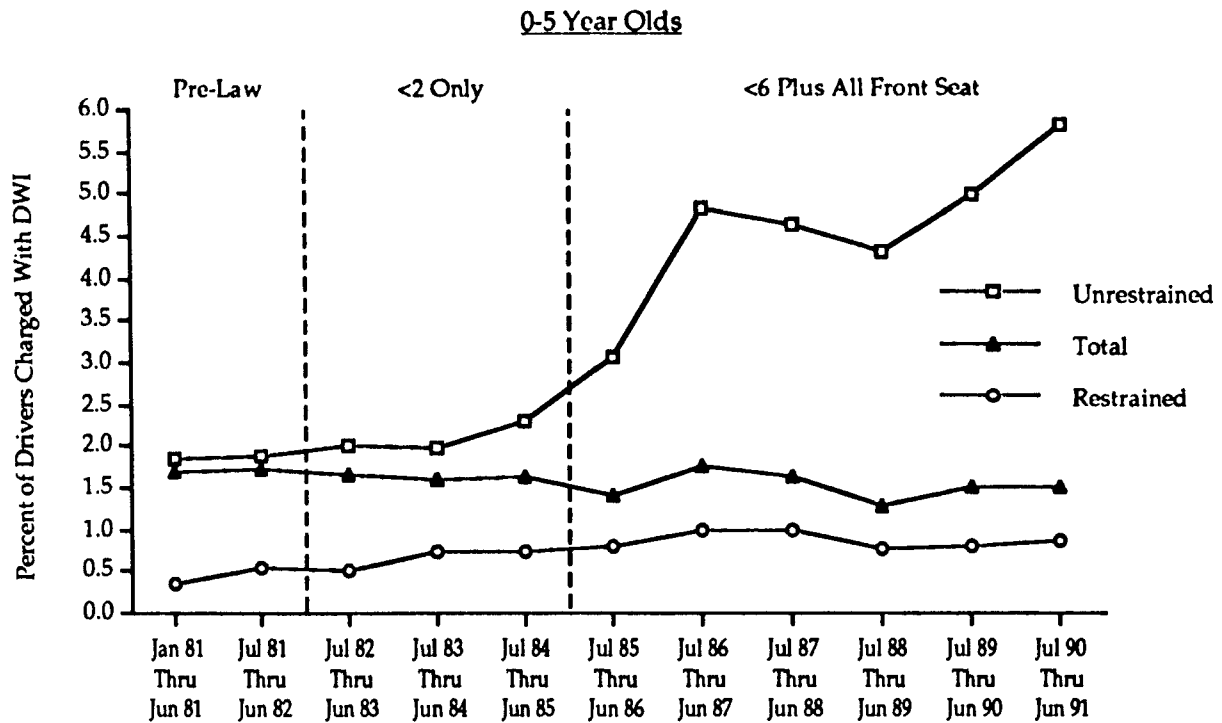
urban areas (>70% developed) for both age groups. In fact, the K+A rate for the rural areas is around two and a half times greater than for urban areas for both age groups. For the 0-5 year olds, injury rates have declined for all three localities, but the 25 percent reduction in urban areas has been greater than the 16 and 11 percent reductions for rural and mixed localities. For the older children, injury rates increased by four percent for the rural and mixed localities and declined by 15 percent for the urban areas. The above mentioned seat belt surveys indicate that belt usage is higher in urban areas than in rural areas and this would help to explain at least some of the differences in injury rates between localities.

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 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, in the 1.5 to 1.7 percent range, of all drivers 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 restrained and unrestrained. Drivers of children reported to be unrestrained children are 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

Figure 6. Percent of Drivers of Crash Involved 0-15 Year Old Children Charged With Driving While Impaired, 1981 through June 1991.



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 other 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.

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 implementation of the first Child Passenger Safety Law in 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 1989 - June, 1990, these rates were 93%, 86% and 73% 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 CPS 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 43% to 0.99 for 0-1 year olds, by 15% to 1.59 for 2-5 year olds, and by 5% to 2.47 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 3 percent reduction was found. In terms of actual numbers, fatal and serious injuries have been reduced by 390 for 0-5 year olds and by 205 for 6-15 year olds since July 1982.

References

- Hall, W.L., Marchetti, L.M., Lowrance, J.C., Suttles, D.S., and Orr, B.T.
"Comprehensive Program for increasing Use of Safety Seats and Seat Belts for Children and Young Adults: Final Report." UNC Highway Safety Research Center, Chapel Hill, North Carolina, November, 1989. (HSRC-PR 164)
- 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)
- Reinfurt, D.W., Weaver, N.L., Hall, W.L., Hunter, W.W., and Marchetti, L.M.
"Increased Seat Belt Use Through Police Actions." UNC Highway Safety Research Center, Chapel Hill, North Carolina, November, 1990 (HSRC-A144)

RECOMMENDATIONS

- 1) Most of the existing rental programs who serve the lower socioeconomic families are run by county health departments. These health departments have little or no funding available to purchase new child safety seats to replace worn or nonreturned rental seats. The GHSP office should consider providing funding to those departments who need financial assistance in order to continue this vital service to their communities or to alter their programs to other types of distribution programs.
- 2) Seat belt use is lower in the western and eastern regions of the state as compared to the piedmont and is lower for the rural than urban areas. Promotional efforts should be designed with emphasis on reaching these populations. More information is needed concerning what messages will reach rural populations and what are the best avenues for communicating the information.
- 3) Efforts need to be continued to encourage the law enforcement community to actively enforce the Child Passenger Safety and Seat Belt Laws. Restraint usage for children and young adults has increased over the years, but there are still many children who are riding unprotected. Active enforcement campaigns should bring these rates up to the highest levels possible.

Appendix A

N.C. Operational Safety Seat Rental/Loaner Programs

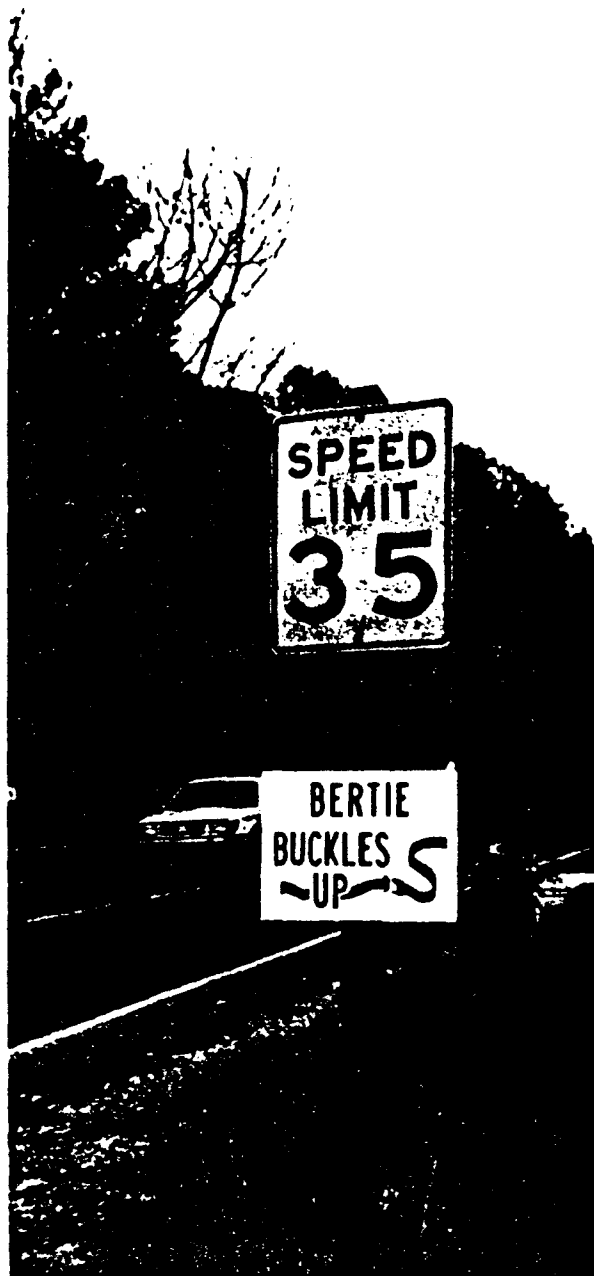
<u>County</u>	<u>Name of Group</u>	<u>Contact Person</u>	<u>Phone #</u>	<u>Conv</u>	<u>Inf</u>	<u>Bstr</u>	<u>Total</u>
Alleghany	Protect Our Little Ones	Deborah M. Pugh	919-372-5641	29	22		51
Ashe	Ashe Co. Health Dept.	M. Burgess	919-246-9449		50		50
Bertie	Bertie Co. Health Dept.	Viola P. Hughes	919-794-2057	53			53
Brunswick	Brunswick Co. Health Dept.	John Crowder	919-253-4381	30			30
Brunswick	Brunswick Hospital Volunt. Aux.	Harriet Olson	919-579-3791	34			34
Burke	Burke Co. Health Dept.	Linda Anderson	704-433-4250		79		79
Cabarrus	Cabarrus Co. Health Dept.	Peggy Spraker	704-782-8437		250		250
Carteret	Carteret General Hospital Auxiliary	Kyra Moore	919-247-1616	3	15	3	21
Caswell	Caswell Co. Health Dept.	Brenda P. Gant	919-694-4129	3	1		4
Chatham	Chatham Co. Birth Center	Angela Lugiano	919-542-3264		?		?
Chatham	Pittsboro S.A.F.E.	Elva J. Butler	919-542-3200	149	59		208
Cherokee	Cherokee Co. Health Dept.	Judy Liley	704-837-7486	38	31		69
Chowan	Chowan Co. Health Dept.	Debbie Bunch	919-482-7001	115			115
Chowan	Chowan Hospital	Claire Mills	919-482-8451		15		15
Clay	Clay Co. Health Dept.	Anita M. Rogers	704-389-8052	30	10		40
Cleveland	Cleveland Co. Health Dept.	Beth Phillippi	704-484-5170	103	135		238
Cleveland	Shelby Jr. Woman's Club	Patty Monday	704-434-7319		45		45
Columbus	Columbus Co. Seat Loaner Prog.	Phyllis Mclymore	919-642-5700	60	80		140
Cumberland	Army Community Service	Henry B. Berry	919-396-6013	75	150		225
Cumberland	E. Newton Smith Pub. Health Ctr.	Rita Starks	919-483-9046	150	200		350
Cumberland	Western Medical Group	Debbie McNeill	919-436-2901		5	4	9
Dare	Dare Co. Health Dept.	Cathy Doyle	919-473-1101		24		24
Davidson	Community General Hospital	Jane Wilder	919-472-2000		40		40
Davidson	Lexington Memorial Hosp.	Shirley S. Buchanan	704-246-5161		53		53
Davie	Davie County Hospital	Becky Wallace	704-634-8100		35		35
Duplin	Duplin Co. Seat Rental Prog.	Debra Beasley	919-296-0441		21		21
Durham	Durham Co. Hospital	Ann Marie Lingenfelter	919-470-4150		500		500
Edgecombe	Tar River Jaycees	Shari Dunn	919-442-5762		40		40
Edgecombe	South Edgecombe Jaycees	Alton L. Webb	919-827-5627	2	22		24
Forsyth	Forsyth Co. Seat Loaner Prog.	Gale Favors	919-723-3601		75		75
Franklin	Franklin Co. Health Dept.	Tena Bullins	919-496-2533	170	75		245
Gaston	Gaston Memorial Hospital	Joy Watson	704-866-2257		50		50
Gaston	Gastonia Police Dept.	David Luoto	704-866-6873	10	30		40
Gates	Sunbury Women's Club	Susan H. Ward	919-465-8861		10		10
Granville	Granville Medical Center	Pat Newell	919-693-5115		250		250
Granville	Southern Granville Junior's Club	Toni Wheeler	919-575-6421		24		24
Greene	Greene Co. Health Dept.	Peggy Letchworth	919-747-8181	35	4	4	43
Guilford	Junior LUV Buckles	Susan Pardue	919-379-4145		425		425
Guilford	Wesley Long Comm. Hospital	Cindy Jarrett Pulliam	919-854-7613		287		287
Haywood	Haywood Co. Health Dept	Rene Rinehart	704-452-6675	4	49		53
Henderson	American Red Cross (Pilot Club)	Dale Gillespie	704-693-5605	10	15		25
Hoke	Hoke Co. Health Ctr.	Mary E. Edwards	919-875-3717	10	62		72
Iredell	Davis Community Hospital	Taryn Johnson	704-873-0281		25		25
Iredell	Lake Norman Medical Center Aux.	Rosalind Doehm	704-663-1113		33		33
Jackson	Community Injury Prevent. Prog.	Frieda Huskey	704-497-7297	50			50
Jackson	Jackson Co. Health Dept.	Linda Fisher	704-586-8994		40		40

<u>County</u>	<u>Name of Group</u>	<u>Contact Person</u>	<u>Phone #</u>	<u>Conv</u>	<u>Inf</u>	<u>Bstr</u>	<u>Total</u>
Johnston	Johnston Co. Health Dept.	Hazalene Barfield	919-989-5200		6		6
Lee	Sanford Jaycees	c/o Sanford Pediatrics	919-774-7117		150		150
Lenoir	Lenoir Co. Home Extension	Anne Gaddis	919-523-9339	30	45		75
Lincoln	Grandma's Pride LCH Auxiliary	Pam Null	704-735-3071	1			1
Lincoln	Lincoln Co. Health Dept.	Donnice M. Phillips	704-735-3001		54		54
Macon	Macon Co. Health Dept.	Rebecca Barr	704-369-9526		110		110
Martin	Martin Co. Health Dept.	Cammie Britton	919-792-7811	104	110	11	225
Montgomery	Montgomery Hospital	Cathy Thompson	919-572-1301		15		15
Moore	Moore Co. Health Dept.	Lynn Ballenger			100		100
New Hanover	Cape Fear American Red Cross	Pam Thompson	919-762-2683	1	84	1	86
Northampton	Northampton Co. Health Dept.	Deborah A. McWilliams	919-534-5841		12		12
Orange	Buckle Up Baby	Belinda Jones	919-732-8181		?		?
Pasquotank	PPCC Health Dept	Andrea S. Held	919-336-4316	63	20		83
Pitt	Pitt Co. Health Dept.	Paunce Alexander	919-752-7151	125	250		375
Pitt	Pitt Memorial Hospital	Etsil Smason	919-551-4491		100		100
Polk	Hickory Grove Bapt Young Women	Beth Garrett	704-894-8413	2	6	2	10
Randolph	Randolph County Health Dept.	Ellen Williams	919-629-2131		170		
Robeson	Lumberton Jr. Womens Club	Susie Brady	919-738-1130		85		85
Robeson	Robeson Co. Health Dept.	Connie Scott	919-738-7231	132	266		398
Rockingham	Annie Penn Memorial	Fran Hughes	919-634-4578		50		50
Rockingham	Eden Jaycee Women	Bobbie Blakely	919-623-9711		43		43
Rockingham	Fraternal Order of Police	Sandra Duncan	919-623-9755	48			48
Rowan	Rowan Co. Health Dept.	Lynne Hauser	704-633-0411	91			91
Rowan	Zeta Phi Beta Sorority, Inc.	Ella M. Hargett	704-633-0411		30		30
Rutherford	Rutherford Co. Hospital	Karen Moore	704-286-5000		12		12
Sampson	Mt. Olive Jaycees	Marie Kelley	919-658-8148		5		5
Sampson	Tri-County Community Health Ctr.	Joan M. Guire	919-567-6194		30		30
Stanley	Albemarle Police Dept.	Capt. Matt Cagle	704-982-1131	yes	yes		
Stanly	Hospital Auxiliary	Bette W. Wagoner					
Stokes	Stokes Co. Health Dept.	Joyce Wheeling	919-593-2811	5	10		15
Surry	Surry Co. Health Dept.	Mary K. Loftis	919-374-2131		45		45
Swain	Swain Co. Health Dept.	Connie Sutton	704-488-3198	18	32		50
Transylvania	Brevard Jaycees	Rick Byrd	704-883-3116	65	65		130
Tyrrell	Tyrrell Co. Health Dept.	Ernestine Hassell	919-796-2681	10	25		35
Wake	Apex Jaycees	Mike Hodgin	919-362-8210	10	10		20
Wake	Mothers of Twins	Gail Lehning	919-467-2927	22	18		40
Wake	Wake Medical Ctr.	Marie L. Cashwell	919-250-8293		677		677
Warren	Warren Co. Health Dept.	Belle Burgess	919-257-1185				
Washington	Washington Co. Health Dept.	Maureen Hastings	919-793-3023		65		65
Watauga	Development Evaluation Ctr.	Bruce N. Richter	704-264-1280	3	20	2	25
Wayne	Goldsboro Junior Woman's Club, Inc.	Jewel Sauls	919-736-1110		650		650
Wilkes	BROC Head Start Seat Loaner Prog.	Judi Mitchell					
Wilson	Wilson Co. Exten. Homemakers	Cheryl D. Summers	919-237-0112		7	3	10
Wilson	Wilson Memorial Hospital Aux.	Sally Estes	919-243-3972		159		159
				1893	6872	30	8625

Appendix B

Highway Safety Directions Newsletter Covers

HIGHWAY • SAFETY DIRECTIONS



In This Issue

**Rural Community
Safety Belt Program**
*Innovative efforts see
quick and positive results*

Child Passenger Protection
*Research finds fewer children
being killed and seriously injured
in crashes*

**Air Bags and
Automatic Seat Belts**
*Statewide program to increase
correct use of belts is set to begin*

**Insurance Increases
for Driving While Impaired**
*Public information makes motorists
aware of penalties for driving drunk*

HIGHWAY SAFETY DIRECTIONS

1991 Publications Issue

T

Inside Information

Accident Analysis

Alcohol and Highway Safety

Child Safety

The Driver

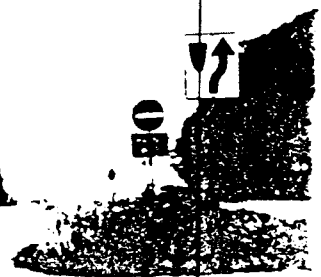
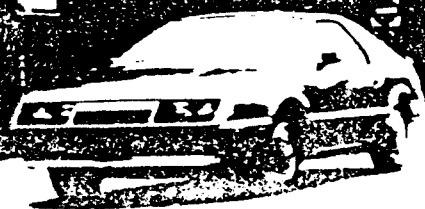
General Highway Safety

Roadway Research

Safety Belt Programs

Safety Belt Restraints

Trucks



Appendix C
North Carolina Geographical Regions

North Carolina Geographical Regions

