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

FINAL REPORT
1990

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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 and the NC Passenger Safety Association who collaborated in the development of and helped fund many of the programs and activities conducted throughout the year.

For NC Child Passenger Safety Awareness Week, we had the opportunity to work with the NC Division of Motor Vehicles, School Bus and Traffic Safety Section, the NC Department of Instruction, School Services Division, and the Office of the Governor, Division of Non-Public Education. The support and cooperation of the School Bus and Traffic Safety Section, and especially the local Traffic Safety Education Specialists who coordinated efforts on the local level, was critical to the success of this project.

For three years, HSRC worked with Take One Productions to produce *Seat Belts: A Program for North Carolina Law Enforcement Officers*. We would like to take this opportunity to express our appreciation for the enthusiasm and extra effort that the Take One staff put into producing what we believe is one of the best video programs of this type in the country.

Finally, 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, Cindy Lohr and Sandy Owens.

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) began a child passenger safety education program. With the financial 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 past 12 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 13 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.

Continued Advice and Counsel to North Carolina Safety Seat Rental Programs

HSRC continues to provide advice and counsel to existing child safety seat rental programs across the state. Most of the advice is relayed to the rental program's contact person via HSRC's toll free phone line. Most inquiries fall into three categories: 1) requests for HSRC's recommendation regarding which brand of safety seats a program should buy to replace a diminishing inventory (and how to dispose of old seats); 2) calls from newly assigned rental program directors seeking advice on all aspects of rental program operation and how to obtain training; and 3) calls from health educators associated with rental programs who are double-checking to make sure they are relaying correct information to their clients regarding proper seat belt and safety seat use, the N.C. Child Passenger Protection Law, use of previously owned or accident involved safety seats, and the safety of aging seats and a program's liability when renting out older seats.

North Carolina has approximately 94 existing programs with an inventory of over 9,500 safety seats available for rental. It would appear that the number of rental programs has significantly increased over the 81 reported in existence in the 1989 final report. However, even though some new programs have been established or restarted and others have ceased operation, the increase is primarily a "record keeping increase", not actually new programs. To explain, in the late summer of 1989 questionnaires were sent out to all programs inquiring about their program status. As of October, 1989 programs that did not respond to the questionnaire and could not be contacted by phone were dropped from the list of active programs. HSRC continued to receive long over due questionnaires as late as Spring, 1990

reporting that programs dropped from the list were still in existence. Thus, these programs were added back on the roster. Late responses were typically due to turnover of program coordinators and slow forwarding of correspondence to the new contact representatives. As indicated in the 1989 final report, HSRC received conflicting information from a variety of sources regarding program status and the current inventory of safety seats available for rental. The list of rental programs and their inventories in Appendix A should be considered as an approximate count. HSRC maintains and updates this list in order to assist parents in locating rental programs in their area.

The number of operational programs in North Carolina seems to be stabilizing. Each year a few programs cease operation and a few new programs are started up or restarted. Of the programs who stopped renting out seats, most converted their programs to an "at cost sale" program with a continued education component to assure that the seats are properly used. Grants from the Injury Control Section of the Department of Environment, Health, and Natural Resources provided several programs with seed money to purchase new seats in order to restart their programs which had ceased operation due to loss of seats from nonreturn or aging.

As shown on the map in Appendix A, 68 of the 100 counties in North Carolina have at least one rental program. Fifty-two of the rental programs offer infant car carriers only and 26 programs offer both the convertible and infant car carriers. Eight programs offer convertible model seats only, two offer infant car carriers and booster seats and six programs offer all three types of seats. The largest seat inventories are maintained by programs operated through health departments and hospitals. Other programs with varying inventories of all types of safety seats continue to be operated by local service groups, clubs, the Red Cross, and police departments.

Most programs offered through county health departments have become an integral part of their community service (out reach) programs. Major hospitals use rental programs as a public relations tool to strengthen their image within the

community and to entice expectant mothers to deliver at their hospital because of the easy access to an infant car carrier and training on child passenger safety including how to properly use safety seats. These continue to be the strongest and most viable rental programs.

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. HSRC continued to offer Occupant Protection Training Workshops which provide training on how to properly use the safety seat(s) that are or will be used in their local program. Program representatives are continuously encouraged to send new workers to Chapel Hill for the one-day workshop.

HSRC also keeps the programs well informed through mail outs which provide such items as technical updates, notification of upcoming workshops and conferences, and the availability of educational materials at the state and national level. All rental programs receive HSRC's newsletter, "Directions" which provides up-to-date safety related information such as safety seat recalls, when to use certain types of safety seats and seat belts, and technological information regarding such subjects as passive restraints and air bags. Rental programs can also request bulk quantities of the, "Growing Up Buckled Up" brochure through HSRC or the Governor's Highway Safety Program Office. They may also receive the North Carolina Child Passenger Safety Association's newsletter, "Beltline" which keeps them informed about child passenger safety activities across the state. Groups inquiring about setting up a rental program are sent, "A Guide for Establishing a Car Safety Seat Rental Program," which provides step by step instructions and training information.

Occupant Protection Training Workshops

HSRC offers Occupant Protection Training Workshops for highway safety and health professionals along with volunteers interested in obtaining an overview of the motor vehicle accident problem and what measures can be taken to prevent or reduce the resulting deaths and injuries. Participants receive up-to-date training in

the proper use of seat belts and child safety seats and learn how to conduct a safety seat installation clinic or how to establish and maintain a safety seat rental program. 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 with the major emphasis being the correct use of safety seats:

<u>Date</u>	<u>Location</u>	<u>Group Represented</u>	<u># Attendees</u>
01/11/90	Chapel Hill	Albemarle Police Department	3
		Gastonia Police Department	2
		Chatham (Siler City) Hospital	1
06/14/90	Charlotte	Charlotte TIPP Program	2
		Hemby Pediatric Trauma Institute	2
		University Hospital Newborn Nursery	1
		Carolina's Medical Ctr. Newborn Nursery	1
		Carolina's Medical Ctr. Pediatrics Dept.	1
		Presbyterian Hospital Newborn Nursery	1
		Charlotte Mecklenburg Schools	1
09/19/90	Waynesville	12 Haywood County area day care centers	33
09/20/90	Waynesville	Haywood County Health Department	9
		Jackson County Health Department	1
		Macon 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 was dissolved during the year 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 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 a HSRC staff member, however, this person resigned from that position after the annual conference and will serve 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 1989 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 during which a statewide poster contest was conducted for elementary

school children in North Carolina. The contest was coordinated on the local level by the Division of Motor Vehicles School Bus and Traffic Safety Education Coordinators.

NCPSA, with the assistance of HSRC, continued publication of the "Carolina Belt Line," its quarterly newsletter which reports to members association, regional and community activities, research findings, publications, etc. Members of the Association also attended state and national conferences to establish contact with other advocates, exchange ideas and learn about other occupant protection programs, set up displays and distribute information, and recruit new members.

NCPSA continues to be the only statewide organization of its kind in the U.S. Members remain committed to the organization and believe in their objectives, and their involvement in statewide and local programs have benefited North Carolina citizens and occupant protection programs around the state. Resources continue to be limited, because of relying primarily on memberships, donations, and fund raisers to garner funds, but assistance is sought and solicited from other resources both in and out of state which are available. This past year NCPSA did apply for and receive federal tax exempt status which should enhance efforts to receive additional funds and sponsorship for activities it plans to conduct. Membership is maintained with approximately 250 members each year and there is good representation from most of the NCPSA regions. At the annual conference members approved by-laws changes to consolidate the ten NCPSA regions into five regions and create a State Coordinator position. The State Coordinator will work with the five regions and its coordinators to present and implement NCPSA objectives and activities.

Under this project, HSRC provided staff support for manning the State Fair booth in October, 1989 and also supplied display and handout materials.

For the NCPSA Conference, HSRC staff invited and made arrangements with exhibitors, coordinated preregistration, provided materials for the registration packet, handled some of the hotel arrangements, had staff members serve as conference speakers, and worked with conference sponsors to secure donations.

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 and participated in the National Lifesavers 8 Conference in San Diego, and the North Carolina Lifesavers 9 Conference in Wrightsville Beach. In addition, project staff served on an occupant restraint panel for the National Safety Council Annual Safety Congress held in Chicago, assisted with workshops conducted for health educators by the Division of Health Services Injury Prevention Program and GHSP, and assisted with the GHSP sponsored law enforcement occupant protection training workshop held in Greensboro.

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 given to North Carolina residents.

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. These handouts are designed to be one or two page reproducible handouts that are 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, and restraint options for older children.

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, 88 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 3700 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. During this project year, Directions featured a handout concerning automatic safety belts, air bags, and their use with child safety seats. The Directions mailing list contains approximately 1,000 out-of state and 135 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 continues to publish its own quarterly newsletter, *Carolina Belt Line* with the administrative support of 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 275 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 calls 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 both passenger safety and general highway safety issues. 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 eight other issues. Three issues went out during this reporting year (copies of covers included as Appendix B). The first issue, Winter 1990, featured articles covering trends among older drivers, drinking and driving by young females, non-sanction safety belt enforcement, changes to North Carolina motor vehicle/traffic law, and progress made in child passenger protection in North Carolina.

The older drivers article highlighted research showing increases in the driver population of people age 65 and over, but no corresponding increases in crash involvement. The drinking and driving article detailed research that found increasing numbers of young female drivers being charged with driving under the influence as well as increased involvement in alcohol-related crashes. The child passenger safety article relayed research information showing that approximately

500 children in North Carolina had survived crashes because of the state's child seat law, seat belt law and increased use of belts and child seats.

The second issue, Spring/Summer 1990, served as the Center's periodic publications guide. This issue listed hundreds of HSRC publications available through the Center's library. Reports and articles listed fell under several different categories, including Accident Analysis, Alcohol and Highway Safety, Bicycle Safety, Child Passenger Safety, Driver Studies, Motorcycles and Mopeds, Roadway Research, Safety Belts, Traffic Control, and Trucks. The Child Passenger Safety section listed 15 different publications, while the Safety Belts section included 28.

The third issue, Fall 1990, included articles detailing use and misuse of automatic seat belts by North Carolina drivers, questions and answers concerning automatic seat belts, air bags and their use with child safety seats, research looking at improving curvy, rural roads, and an in-school bicycle safety program for children. The first article mentioned contained the results of research that found only a small percentage of drivers with motorized, automatic shoulder belts buckle their manual lap belts. The second article served as an information guide for persons who own or are purchasing newer vehicles with automatic restraints, and how these restraint systems work with child safety seats. The bike article looked at a pilot program to teach bicycle safety in elementary schools through physical education classes.

Overall, each issue has received a favorable response with inquiries from the media and requests from agencies, groups and persons for further information or permission to copy and distribute articles. The Winter 1991 issue is scheduled for completion in March.

Development of Seat Belt Videos for Law Enforcement Officers

The final videotape presentations segment was developed and produced this year for training law enforcement officers on seat belt and child passenger safety law enforcement. This segment plus the two segments produced under last year's project augment the first two segments that were distributed to law enforcement agencies during project year 1987-88. The original segments "The Need for Seat Belts" and "North Carolina's Seat Belt Laws" covered the reasons why officers

should wear their own belts and the need for officers to enforce the seat belt law. The segments produced last year, entitled "Enforcing North Carolina's Belt Laws" and "Crash Dynamics, How Seat Belts Work", give officers tips on enforcing the seat belt and child passenger safety laws and explain crash dynamics. The final segment, "Growing Up Buckled Up", explains how child safety seats and belts work for children, describes the different types of safety seats that are available and discusses the problems that exist when seats are misused. The topics for these last three segments were chosen as the result of survey information received from the police and sheriff departments and highway patrol troop and district headquarters after distribution of the first two segments.

As with the first two segments, an advisory committee was formed consisting of representatives from local police and sheriff departments, the Highway Patrol, and other law-enforcement-related professions such as the Attorney General's office and police science training programs.

The committee members were as follows:

Earl Hardy, North Carolina Justice Academy, Salemburg
Yvette Ruffin, Governor's Highway Safety Program, Raleigh
Officer Charles Bean, Forsyth County Sheriffs Department, Winston-Salem,
Officer Carolyn Hutchison, Carrboro Police Department, Carrboro
John Riley, Director of Public Safety Training, Southwest Tech. College, Silva
Captain Wade Henderson, Greensboro Police Department, Greensboro.
Officer Steve Hunt, Hickory Police Department, Hickory.
Captain Daniel Summey, Hendersonville Police Department, Hendersonville
Chief David Fortson, Cary Police Department, Cary
Captain Jim Carver, Cary Police Department, Cary
Sergeant M.D. Fryer, State Highway Patrol Training Center, Raleigh
Chief Ken Bumgarner, Morehead City Police Department, Morehead City
Officer Wrenn Johnson, Morehead City Police Department, Morehead City
Ralph Strickland, NC Attorney General's Office, Raleigh

The advisory committee met in Chapel Hill and made suggestions and comments on draft scripts. Revised scripts were then sent to the members for further comment. The committee advised HSRC on content, appropriate spokespersons and potential crash testimonials.

HSRC contracted with the company that produced the first segments, Take One Productions in Raleigh, to produce the rest of the series. The final product was a

videotape that contains all five segments and was distributed as the focus for Buckle Up North Carolina Week during the spring of 1990.

The primary purpose for producing this program was to inform North Carolina law enforcement officers of the need for belts, components of relevant laws, and to encourage them to enforce the laws. Thus, the target audience is the officers themselves and the "actors" in the program are primarily other officers. This format has been well received by the local departments. At the same time, it was felt that the local departments would probably use the program for public information purposes, such as showing portions of it when they had to give a presentation to a local group, and efforts were made to make the content of the program as suitable for general audiences as possible. Indications are that the tape is in fact being used by local departments for presentations to the public. Under a separate GHSP project, "Increased Seat Belt Use Through Police Actions," questionnaires were sent to all North Carolina police departments requesting information on their levels of enforcement activities related to the Seat Belt and Child Passenger Safety laws. One of the questions asked if and how this tape was being used. In addition to being used for police training, other responses included that it was being made available for check out for viewing in private homes, shown to young drivers, D.A.R.E. programs, programs at local hospitals, driver education classes, church groups, mall presentations, scout groups, training fire/police rescue personnel, and civic clubs.

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

As he has done in the past, Governor Martin declared the week of Valentine's Day as North Carolina Child Passenger Safety Awareness Week to coincide with National Child Passenger Safety Awareness Week. This year, NCPSA, GHSP and HSRC, in conjunction with the Division of Motor Vehicles School Bus and Traffic Safety Education Section, decided to conduct a seat belt safety poster contest for North Carolina elementary school children as the focus of CPS Awareness Week. The statewide poster contest was conducted for children in the grade categories of K-1, 2-3, and 4-6. The content of the poster had to relate to safety belts or child safety seats and had to convey a message to convince others to buckle their safety belts or to buckle young children in child safety seats. The contest was also sponsored and endorsed by the NC Department of Public Instruction and the Governor's Office of Non-Public Education.

The contest was coordinated on the local level by the DMV School Bus and Traffic Safety Education Specialists who contacted local schools and encouraged their participation and also coordinated the judging of the posters at the county level once three school winners for each grade category had been determined. NCPSA Regional Coordinators then received county winning posters for the respective counties in their region and judged them for regional winners which in turn advanced to the state competition. In each round of competition, first, second and third place winners were selected who then advanced to the next level of competition until the state winners were eventually selected. Each child who participated in the contest received a seat belt related sticker. The nine winners at each school received certificates of award and all regional winners also received certificates. The nine state winners all received a \$100 savings bond and certificates denoting them as 1st, 2nd or 3rd place winners. The three state first place winners (one for each grade category) and their families received a two nights stay at Wrightsville Beach to receive their awards. The awards consisted of a framed certificate, trophy and the \$100 savings bond during the NC Lifesavers 9 Conference. A list of the state and NCPSA regional winners and the schools and counties or school system they represent, as well as a contest flier that includes the rules, are

included as Appendix C.

NC Lifesavers Month Activities

For the fourth 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 seats, obeying speed limits and of not drinking and driving.

Lifesavers Month activities actually began in April with the 9th North Carolina Lifesavers Conference that was held April 22-24 at the Blockade Runner in Wrightsville Beach. Sponsors of the conference included the Governor's Highway Safety Program, the North Carolina Passenger Safety Association (NCPSA) and HSRC. Conference announcements were mailed to over 8,000 persons interested in occupant protection and injury prevention and was also announced in other agency newsletters.

Approximately 200 professionals and volunteers associated with local, state, and national agencies concerned with traffic safety issues attended the conference. Arranged under the theme, "Renewing Our Commitment in the '90's," the conference included an array of workshops, general sessions and exhibits featuring state and national leaders affiliated with a variety of highway safety related organizations from North Carolina and out-of-state. Keynote speaker was Dr. Kimball Maull, a distinguished scientist from the University of Tennessee Medical Center at Knoxville. Awards luncheon speaker was Sgt. C.E. "Buddy" Price of the NC State Highway Patrol in Fayetteville.

General sessions and concurrent workshop presentations were conducted on the following topics: Drugs, Drinking and Driving; Operation Lifesaver; Laughter with a Message; Bicycle Helmet and Safety Programs; Seat Belts and Child Restraints; Injury Prevention; New Changes Affecting Commercial Drivers Licenses; Transportation in an Aging Society; and School Buys Safety and Community Involvement.

Three North Carolina school children were recognized for their first-place award winning posters which were prepared during Child Passenger Safety Awareness Week in February. These children represented three grade categories: K-1, 2-3, and 4-6. NCPSA also presented a media service award to a newspaper journalist and a loaner program award to a child safety seat loaner program for their passenger safety contributions to the citizens in their local areas.

Other Lifesavers Month efforts centered around the distribution of the HSRC/GHSP training tape, "Seat Belts: A Program for North Carolina Law Enforcement Officers." The major objective for this month was to encourage local law enforcement agencies to promote the use of safety seats and belts in their communities through local promotional activities and active enforcement of NC's restraint laws. HSRC, in conjunction with GHSP and NCPSA, provided all local police and county sheriff's departments, and State Highway Patrol troop and district headquarters with a copy of the tape to be viewed by officers. In addition, they were all supplied with a "Buckle Up America Idea Sampler" furnished by the National Highway Traffic Safety Administration, masters of a variety of educational materials, and 500 seat belt stickers for kids. In all, 378 police departments, 100 sheriff's departments and 67 State Highway Patrol offices were provided with videotapes, information and materials.

In order to evaluate how well these packets were received and if the officers would in fact use them, a self-addressed postcard was included for the department to fill out and return. Postcard returns were disappointingly low with less than 15 percent (81) of the law enforcement agencies returning them. Whether this is a true indicator of the level of use or if the other departments just did not respond is not known. Of those that did respond, presentations to school groups and civic clubs made up the most prevalent types of activities that were conducted.

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

As was previously mentioned, educational efforts began 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 children less than age six. As would be expected, 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. As many or more children have been killed in the past couple 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. In fact, in 1989 thirteen of the fatalities were suffered by children who were ejected from the vehicle in the crash or who fell from moving vehicles. These deaths almost certainly would not have occurred if the children had been secured in restraint systems.

Another reason to question the value of restraint systems is due to the number of children for the past several years who have been killed while restrained. This question and 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. Based on a fatality reduction estimate of 60 percent for properly used safety seats and belts, there probably would have been 12 to 15 children killed in 1989, rather than 33, if all crash involved children had been restrained.

Figure 1. Police Reported Restraint Usage Rates
for Accident Involved Children
January, 1981 through June, 1990

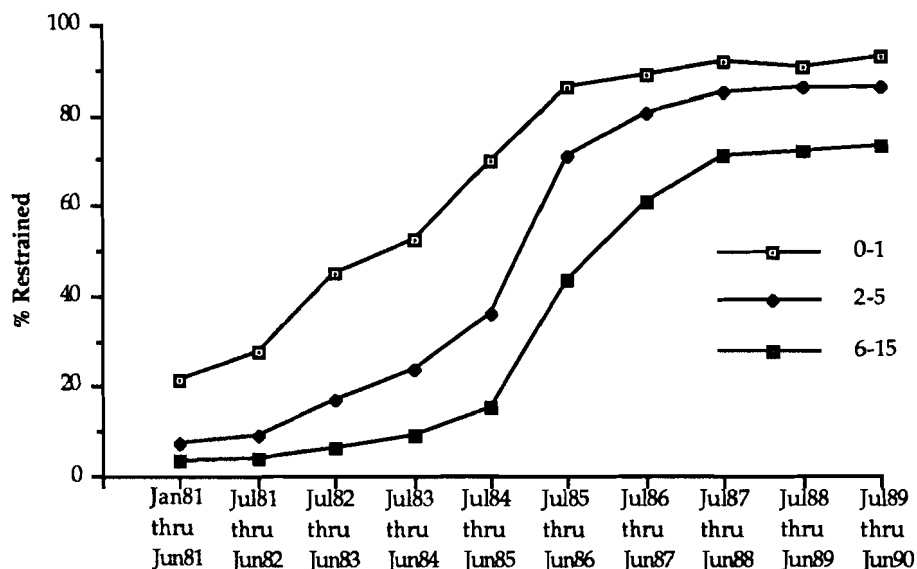
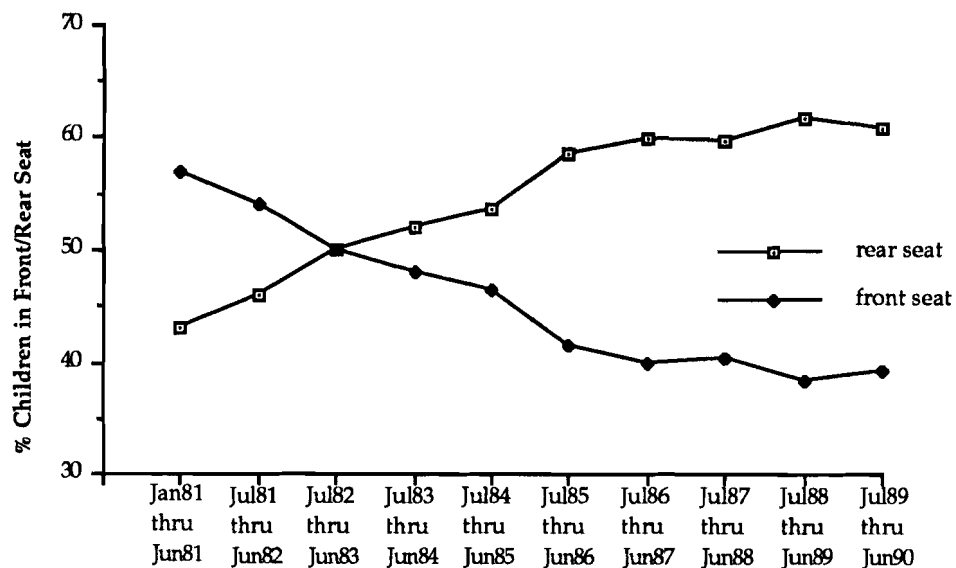


Figure 2. Percentage of Accident Involved 0-5 year Old
Children Riding in Front Seat Versus Rear Seat



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 93 percent from July 1989 through June 1990. While the reported usage rate for 2-5 year olds also increased substantially (from 8% to 86%) 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 these children (from 4% prior to 1982 to 73% in 1990) 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 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. 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.

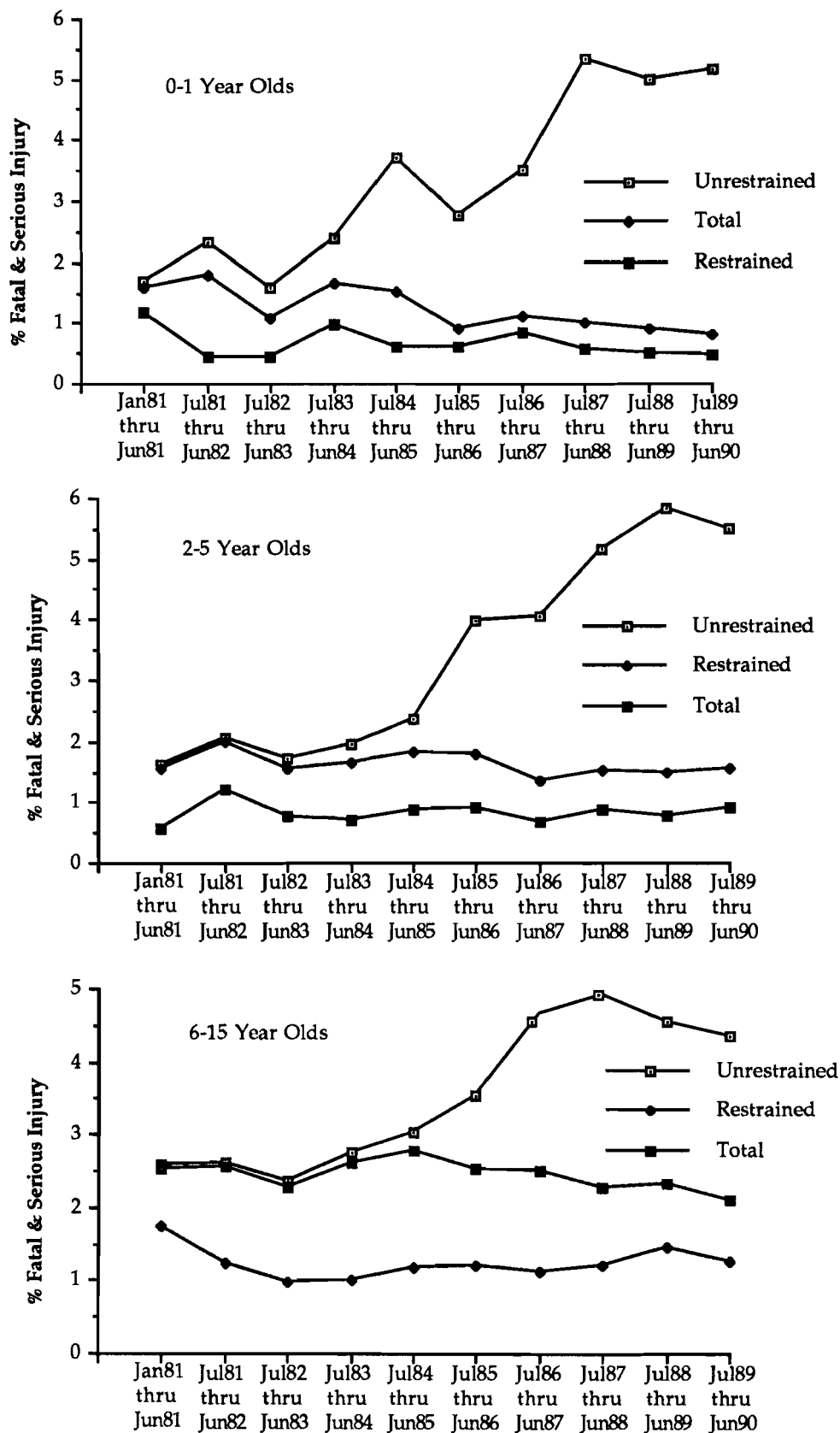
Before proceeding any further in analyses of these accident data, mention should be made of possible biases in these restraint usage rates. In the "typical" accident in North Carolina, the investigating officer arrives at the accident scene some time after the crash. By then, the occupants may have already 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 non-use 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 this past summer 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

Figure 3. Fatal plus Serious Injury Rates for Accident Involved Children,
January, 1981 through June, 1990



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. These figures are encouraging to a degree but reveal that much work still needs to be done in protecting our children, particularly the older ones. 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 (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.

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	Jul 89 Thru Jun 90			
<u>AGE</u>	# K+A	20	45	30	35	42	33	34	31	33	29	PERCENT CHANGE		
0-1	Total #	1221	2514	2553	2133	2701	3337	2895	3046	3429	3458			
	% K+A	1.64	1.79	1.18	1.64	1.55	0.99	1.17	1.02	0.96	0.84	(A)→(B)	(B)→(C)	(A)→(C)
	Avg.%	1.74		1.45			0.99					-16.7	-31.7	-43.1
2-5	# K+A	75	205	169	183	214	213	178	213	225	233			
	Total #	4729	10204	10671	10926	11290	11798	12782	13479	14266	14544			
	% K+A	1.59	2.01	1.58	1.67	1.90	1.81	1.39	1.58	1.58	1.60			
	Avg.%	1.88		1.72			1.59					-8.5	-7.6	-15.4
0-5	# K+A	95	250	199	218	256	246	212	244	258	262			
	Total #	5950	12718	13224	13059	13991	15135	15677	16525	17695	18012			
	% K+A	1.60	1.97	1.50	1.67	1.83	1.63	1.35	1.48	1.46	1.45			
	Avg. %	1.85		1.67			1.47					-9.7	-12.0	-20.6
6-15	# K+A	295	660	604	697	780	719	789	737	774	710			
	Total #	11355	25269	25928	26145	27206	27737	30356	30473	31024	31602			
	% K+A	2.60	2.61	2.33	2.67	2.87	2.59	2.60	2.42	2.49	2.25			
	Avg. %	2.61		2.62			2.47					+0.4	-5.7	-5.4

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 32 percent to .99 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 43 percent (from 1.74 to .99) 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 8 percent to 1.59. The total reduction in the K+A rate for the 2-5 year olds was 15 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 21 percent decrease (from 1.85 to 1.47) 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 6 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

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

Age	Jan 81 - June 82	July 82 - June 85				July 85 - June 90				July 82 - June 90
	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%)	16165	281	160	-121 (-43.1%)	-143 (-32.4%)
2-5	1.88	32887	618	566	-52 (-8.4%)	66879	1257	1062	-195 (-15.5%)	-247 (-13.2%)
0-5	1.85	40274	747	673	-74 (-9.9%)	83044	1538	1222	-316 (-20.5%)	-390 (-17.1%)
6-15	2.61	79279	2069	2081	+12 (+0.6%)	151192	3946	3729	-217 (-5.5%)	-205 (-3.4%)

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 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 90), there was a 43 percent reduction in K+A injuries of 121. Overall, there has been a 32 percent benefit, which can be translated as 143 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 13 percent reduction of 247 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 spill over 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. 15.5% reduction).

Apparently, the 6-15 year olds have benefited very little from any spill over 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 5.5 percent benefit associated with the actual number of K+A injuries seen in the July 85 - June 90 period (3946) when compared to the expected number (3729) based on the 2.61 K+A rate for the first time period. There was an overall reduction of 205 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 16,609 during the July 1985 - June 1990 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. For instance, as Table 2 also shows, there were 250 K+A injuries to 12,718 0-5 year olds during the July 1982 - June 1985 period (for a rate of 1.97). During the July 1985 - June 1990 period, there were 262 K+A injuries to 18,012. To have reduced the actual number of injuries down to 200 during the latter period would have required a K+A rate of 1.11 rather than the 1.45 that is found.

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

Figure 4. Proportion of Restrained and Unrestrained Children in Severe (TAD Severity 4-7) Crashes, 1981 through January, 1990

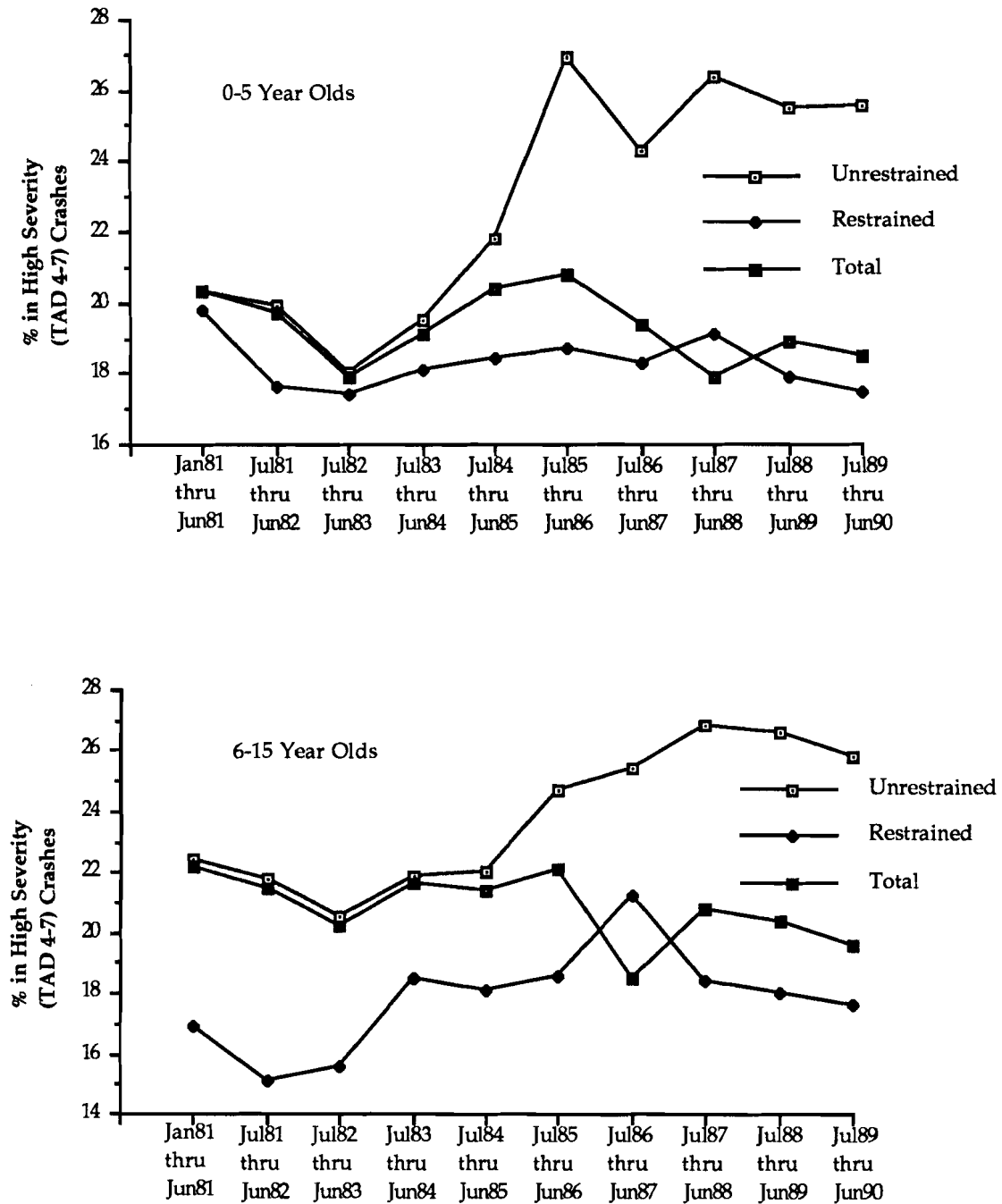
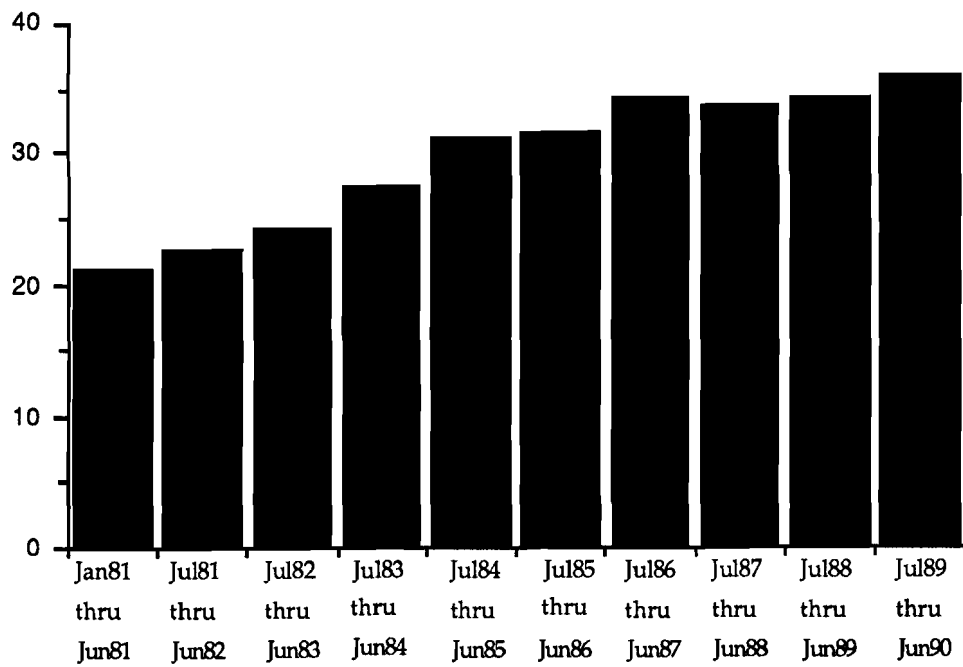


Figure 5. Percentage of Accident Involved 0-5 Year Old Children
Riding in Vehicles Weighing Less than 2500 Pounds



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 2,500 pounds (roughly comparable to light compact and subcompact sized cars) during the first two time periods. This proportion increased 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 D 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 West and Central regions have shown a decline in K+A injuries over the three legislative periods but the rate for the West has been reduced by only 10 percent whereas that for the Central region has been reduced by a third. During this time

Table 4. Fatal Plus Serious Injury Rates for Crash Involved Children in North Carolina by Region of State.

Region	0-5 Year Olds				6-15 Year Olds			
	Jan81- Jun82	Jul82- Jun85	Jul85- Jun90	Total	Jan81- Jun82	Jul82- Jun85	Jul85- Jun90	Total
West	1.90 * (14.6)**	2.08 (14.0)	1.71 (13.5)	1.85 (13.8)	2.86 (16.9)	3.14 (15.9)	3.35 (15.2)	3.21 (15.7)
Central	1.89 (53.8)	1.51 (54.4)	1.26 (55.7)	1.41 (55.1)	2.52 (54.8)	2.42 (54.9)	2.24 (55.3)	2.33 (55.1)
East	1.75 (31.5)	1.77 (31.6)	1.74 (30.8)	1.75 (31.2)	2.63 (28.3)	2.73 (29.2)	2.43 (29.5)	2.54 (29.2)

* 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.

Locality	0-5 Year Olds				6-15 Year Olds			
	Jan81- Jun82	Jul82- Jun85	Jul85- Jun90	Total	Jan81- Jun82	Jul82- Jun85	Jul85- Jun90	Total
Rural	3.02 * (26.4)**	2.79 (27.1)	2.53 (25.2)	2.67 (25.9)	3.99 (30.3)	4.16 (29.9)	4.14 (28.5)	4.12 (29.2)
Mixed	1.87 (21.6)	1.72 (19.7)	1.67 (18.4)	1.71 (19.2)	2.45 (22.0)	2.68 (20.0)	2.55 (18.8)	2.57 (19.6)
Urban	1.25 (52.0)	1.08 (53.3)	0.94 (56.4)	1.02 (54.9)	1.81 (47.8)	1.69 (50.1)	1.53 (52.6)	1.61 (51.2)

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

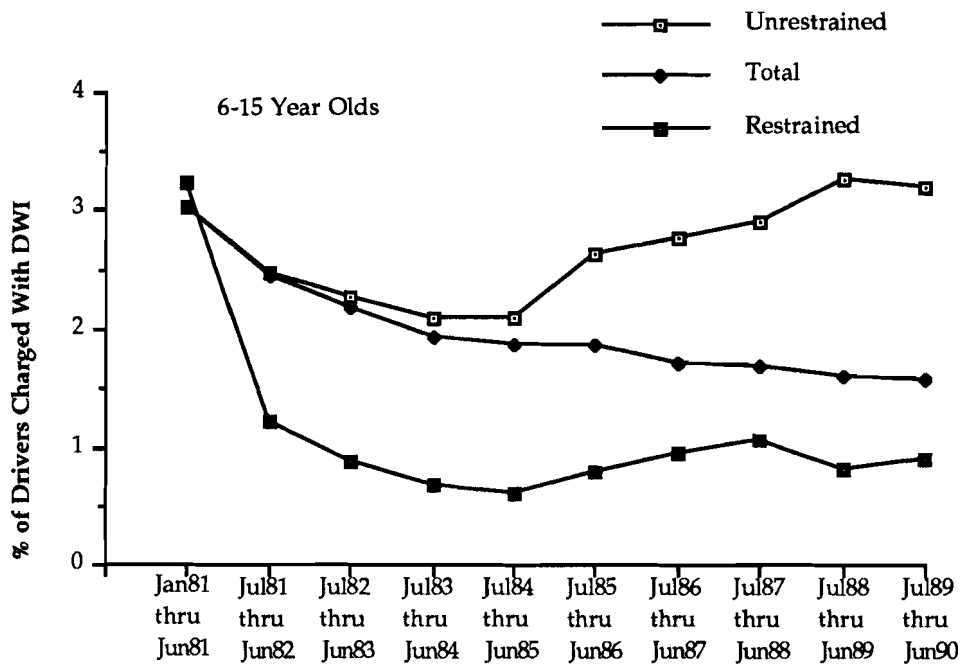
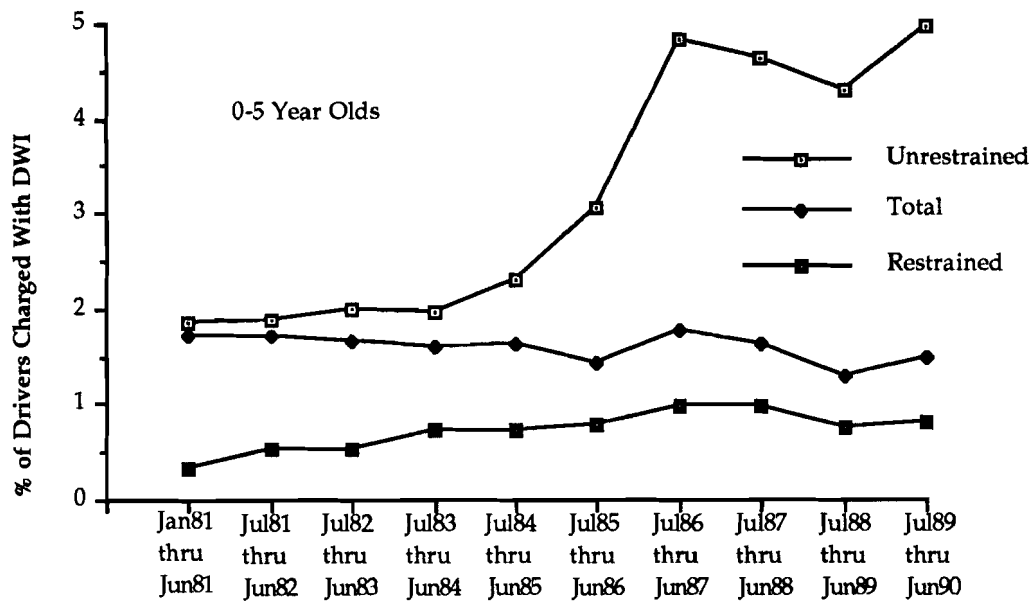
* Percent K+A injuries ** Percent of total occupants for each time period in each locality

the K+A rate for the East has remained constant. 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 11 and 8 percent reductions respectively. 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 injuries 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 urban areas (>70% developed) for both age groups. In fact, the K+A rate for the rural areas is over 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.

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



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 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 non-use 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.
- 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

N.C. Counties With Rental/Loaner Programs

NC SAFETY SEAT RENTAL/LOANER PROGRAMS

September 30, 1990

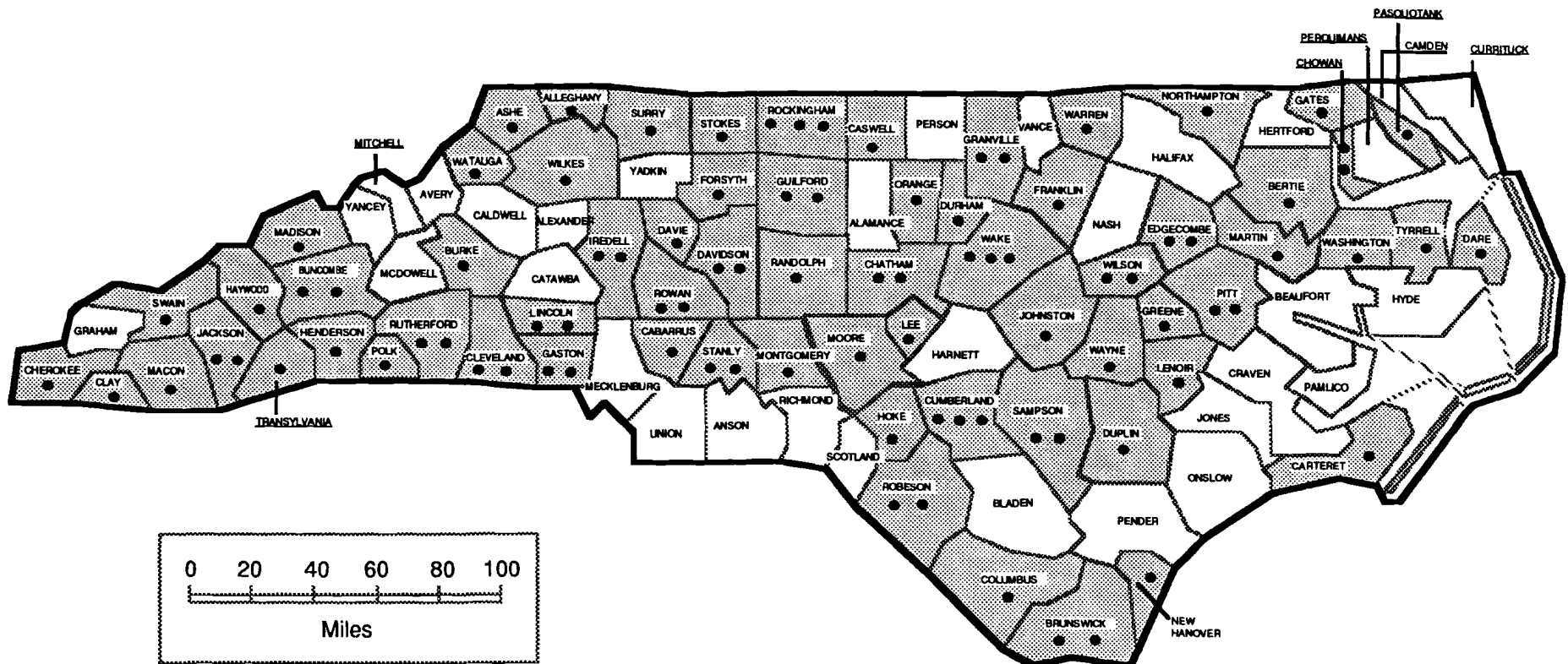
<u>County</u>	<u>Name of Group</u>	<u>Contact Person</u>	<u>Phone #</u>	<u>Conv</u>	<u>Inf</u>	<u>Bstr</u>	<u>Total</u>
Alleghany	Protect Our Little Ones	Deborah M. Pugh	919-372-5641	29	22		51
Ashe	Ashe Co. Health Dept.	M. Burgess	919-246-9449		50		50
Bertie	Bertie Co. Health Dept.	Viola P. Hughes	919-794-2057	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
Buncombe	Buncombe Co. Hlth Dept/Med Auxil	Jo Nan Hester	704-258-9710		400		400
Buncombe	Safe Rider Program	Shirley Ferguson	704-255-5685		300		300
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 McIymore	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	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	Kim C. Queen	704-452-6675	4	49		53
Henderson	American Red Cross (Pilot Club)	Athena W. Metcalf	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.	Rozalind 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

NC SAFETY SEAT RENTAL/LOANER PROGRAMS

September 30, 1990

<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.	Judy Breeze	704-369-9526		110		110
Madison	Madison Co. Seat Loaner Prog.	Carolyn Haynie	704-649-3531		75		75
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.	Patrice 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	Community General Hospital	Jane Wilder	919-472-2000		40		40
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. Health Dept.	Sheila Owensby					
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 Hodgins	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	7477	30	9400

North Carolina Operational Safety Seat Rental/Loaner Programs - September, 1990



- Counties with operational programs
- Indicates number of programs per county

Appendix B

Highway Safety Directions Newsletter Covers

HIGHWAY ○ SAFETY DIRECTIONS



Young women driving drunk, an emerging problem

Despite legislation aimed at curbing drinking and driving and public awareness programs designed to change attitudes toward alcohol, young women appear to be drinking and driving more often. The results of work conducted by the University of North Carolina Highway Safety Research Center indicate that young women drivers' involvement in DWI arrests and alcohol-related crashes is increasing. The story on page four looks at this problem, the possible causes and its research.

In This Issue

Older Drivers

Study looks at crash trends and growing numbers of those 65+

Young Women Drinking and Driving

Research suggests increased DWI involvement by young female drivers

Non-Sanction Safety Belt Enforcement

Project begins examining seat belt enforcement alternative

Changes to North Carolina Motor Vehicle/Traffic Law

A profile of changes enacted during the 1989 General Assembly session

Child Passenger Protection

Progress made in reducing injuries and deaths to young motorists

HIGHWAY ○ SAFETY DIRECTIONS



HSRC Publications

The University of North Carolina Highway Safety Research Center publishes numerous technical reports, project reports, papers, and articles each year. These publications cover research findings and offer solutions to highway safety problems.

This issue of DIRECTIONS lists hundreds of HSRC publications that are available through the Center's library.

In This Issue

Accident Analysis

Alcohol and Highway Safety

Bicycle Safety

Child Passenger Safety

Driver Studies

Highway Safety (General)

Motorcycles and Mopeds

Roadway Research

Safety Belts

Traffic Accident Damage Scale

Traffic Control

Trucks

HIGHWAY ○ SAFETY DIRECTIONS



In This Issue

Use and Misuse of Automatic Seat Belts

*Research looks at belt use patterns
of drivers with automatic systems*

Automatic Seat Belts and Child Safety Seats

*Questions and answers about
newer restraint systems and their
use with child car seats*

Curved Roadways

*Study examines curves and ways
to make winding roads safer and
easier to drive*

Kids and Bicycle Safety

*Program teaches young riders
important traffic rules and
increases skill levels*

Appendix C

Child Passenger Safety Awareness Week Poster Contest List of Rules and Winners

1990 NORTH CAROLINA CHILD PASSENGER SAFETY AWARENESS WEEK SEAT BELT POSTER CONTEST REGIONAL WINNERS

Following is a list of the 1990 NC Child Passenger Safety Awareness Week poster contest regional winners (based on NC Passenger Safety Association regional divisions) presented in order of 1st, 2nd and 3rd place winners within each region. The schools and counties or school systems they represent are also listed:

Grades K-1

Region 1:	Pollen Wellman Antwan Hill Elizabeth Bosma	White Oak Elementary J. P. Law Grandy Primary	Edenton-Chowan Bertie County Camden County
Region 2:	Shelley Moser Abigail Saunders Bobby Riggs	Bangert School Bangert School Pollocksville Elementary	Craven County Craven County Jones County
Region 3:	Christina Fields Anna Whitley Kacie Nobles	Creative World Beulaville Elementary Pink Hill School	New Hanover County Duplin County Lenoir County
Region 4:	Kim Champion Paige Avery Cheryl Sasser	Victory Christian School Micro-Pine Level Elemen. Fremont Elementary	Vance County Johnston County Wayne County
Region 5:	Lauren Trollinger Pamela Perkins Christopher Martin	Monroeton School Nathanael Greene Jamestown Elementary	Rockingham County Guilford County Guilford County
Region 6:	Latasha Mumpfield Vance Jarrell Ben Schact	Harnett Primary Star-Biscoe Elementary Holbrook Elementary	Harnett County Montgomery County Fort Bragg Schools
Region 7:	Will Hubbard Wes White Chase Pullen	Summit School Ellendale School Kernersville Elementary	Forsyth County Alexander County Winston-Salem/Forsyth Co
Region 8:	Mellissa Henderson Graylyn Kallam Elissa Britton	Gastonia Central Charlotte Christian School Charlotte Christian School	Gaston County Mecklenburg County Mecklenburg County
Region 9:	James Reynolds Jonathan Cagle Rusty Dills	Polkville Elementary Edneyville Elementary Polkville Elementary	Cleveland County Henderson County Cleveland County
Region 10:	Glenn Davies Ashley McCall Ryan Stiens	Scotts Creek Elementary Straus Elementary Covenant Christian	Jackson County Transylvania County Jackson County

1990 NC Child Passenger Safety Awareness Week poster contest regional winners:

Grades 2-3

Region 1:	Emily Carpenter Amanda Pike Brandon Sawyer	Albemarle Academy J. P. Law Weeksville School	Pasquotank County Bertie County Pasquotank County
Region 2:	Heather Baker Brett Gibson Ashe Harris	Bangert School Trinity Christian Snow Hill Primary	Craven County Pitt County Greene County
Region 3:	Andrew Walker Leslie Thomas Kelly Hill	Winter Park Primary Day Elizabethtown Primary Bolivia Elementary School	New Hanover Bladen County Brunswick County
Region 4:	Arwen Edmundson Sarah Liles Becky Johnson	Elvie Street School Rock Ridge School Glendale-Kenly Elementary	Wilson County Wilson County Johnston County
Region 5:	Boyanma Trayanova Emily Rogers Danny Hoskins	Hope Valley School Alamance Elementary Hope Valley School	Durham County Guilford County Durham County
Region 6:	Alexis Culbreth Graham Thompson Joshua Denton	Peterson School Harnett Primary Holbrook Elementary	Robeson County Harnett County Fort Bragg Schools
Region 7:	Laura Surratt Drew Murphy Charleen Beckford	Lewisville Wilkesboro School Kernersville Elementary	Winston-Salem/Forsyth Co Wilkes County Winston-Salem/Forsyth Co
Region 8:	Alexandrea Bynum Kristin Privette Jason Haynes	Tabernacle Baptist Christian Hemby Bridge Elementary Shady Brook Elementary	Catawba County Union County Kannapolis City
Region 9:	Jeremy Williamson Carly Rogers Sarah Marshall	Polkville Elementary Lattimore Polkville Elementary	Cleveland County Cleveland County Cleveland County
Region 10:	Nathaniel Cleaveland Woody Walkingstick Shawn Haugrud	Covenant Christian Cherokee Elementary Highlands School	Jackson County Swain County Macon County

1990 NC Child Passenger Safety Awareness Week poster contest regional winners:

Grades 4-6

Region 1:	Allan Mitchell Ashley Beacham Christina Brickhouse	Riverview Griggs School Griggs School	Hertford County Currituck County Currituck County
Region 2:	Julie Kathryn Roper Meredith Adams Chuck Powell	Pamlico Junior High East Greene Elementary Smyrna Elementary	Pamlico County Greene County Carteret County
Region 3:	Teresa Sara Morris Dawn Foyles Olli-Orondava Mary Leth Lewis	Summersill School Savannah Middle School Mumford Clement Spaulding Monroe Middle	Onslow County Lenior County Sampson County Bladen County
Region 4:	Amy Pleasants Nikki Johnson Justin Staab	Pikeville Elementary Micro-Pine Level Wendell Elementary	Wayne County Johnston County Wake County
Region 5:	Candice Thomas Patrick Tuite Julie Swaim	Burlington Christian Siler City Elementary Moss Street School	Alamance County Chatham County Reidsville City
Region 6:	Vetta Hunt Larry Stogsdill Zack Brewer	Piney Grove Holbrook Elementary Star-Biscoe Elementary	Robeson County Fort Bragg Schools Montgomery County Schools
Region 7:	Cami Kotsionis Shanda Morrison Rachel Johnson	Forsyth Country Day Sch Calvary Baptist Day Sch Calvary Baptist Day Sch	Lewisville Forsyth County Forsyth County
Region 8:	Sonia Patel Daniel Brooks Michael Cockrell	Northwest Elementary Bethel Elementary Landis	Davidson County Cabarrus County Rowan County
Region 9:	Matt Alvarez Jason Reynolds Tara Massey	Grover School Polkville Elementary Charles Bell School	KingsMountain Cleveland County Buncombe County
Region 10:	Joel Horne Kevin Steins Andrea Walkingstick	Bethany Christian Covenant Christian Cherokee Elementary	Transylvania County Jackson County Swain County

Appendix D

North Carolina Geographical Regions

North Carolina Geographical Regions

