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An Evaluation of Non-Sanction Community Seat Belt Law Enforcement Programs

by

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Many in the two communities were helpful, starting with the key police department personnel. In Albemarle this was Chief Chuck McManus and Captain Matt Cagle, the local coordinator. In Gastonia this was Chief Jack Postell, project coordinator Captain Danny Cochran, and Sergeant Mark Lanier, who assisted Captain Cochran in all phases. The Statesville community served as a comparison site, and Chief Robert Warshaw and Assistant Chief Press Hilliard helped with the necessary activities, and Lieutenant R.H. Greer supplied monthly activity forms. Other participants from all three communities are too numerous to mention, but we would be remiss if we failed to thank the senior citizens who served as willing and reliable data collectors in Albemarle.

From HSRC, Bill Hall and Beverly Orr were part of the initial proposal writing team. Flo Land and Janie Thomas helped with various aspects of data collection. Jeff Lowrance assisted with PI&E activities and the preparation of the community guidebook that accompanies this report. Chris Little and Cindy Lohr handled the computer programming tasks. Special thanks to Don Reinfurt for statistical consultation and a thorough editing job. Nancy Weaver also helped with the editing. Paula Hendricks, Peggy James, and Teresa Parks used exceptional word processing skills. Many HSRC student assistants helped process the belt use data from all three communities. And, finally, thanks to the Chef at the Yadkin Valley Steak House in Albemarle, N.C.

CHAPTER 1. INTRODUCTION

Overview

Since the mid-1980's, many state seat belt laws have been adopted in the United States. In many cases, statewide belt use rates have remained below 50 percent, although a few states have reported considerably higher use rates. It is generally recognized that the level of seat belt law enforcement is positively related to the use rate, and public information is an important adjunct to enforcement to help sustain the public perception of an active program (Campbell, Stewart, and Campbell, 1987).

Given this background, this report describes a demonstration program carried out for the National Highway Traffic Safety Administration in the category entitled, "Demonstration of Alternate Strategies for Implementing Community-Level Occupant Protection Law Enforcement Programs." The project was performed by the University of North Carolina Highway Safety Research Center (HSRC) in conjunction with the North Carolina Governor's Highway Safety Program (GHSP). The GHSP also provided two 402-funded community grants to support local efforts. The overall project duration, including the evaluation of the strategies, was 29 months (September 29, 1988 through February 28, 1991). Police departments in two different sized communities in the western Piedmont region of North Carolina planned and implemented belt promotion programs during a one-year grant period (October 1, 1989 through September 30, 1990). The duration of the actual promotions was seven months.

Since earlier seat belt enforcement blitzes involving public information, warning tickets, and actual citations had produced dramatic belt use increases in Canada (Jonah and Grant, 1985) and in Elmira, New York (Williams, Preusser, Blomberg, and Lund, 1987), it was decided that the thrust of this project would be non-sanction or "soft" police enforcement reminder strategies, namely: (1) the widespread use of seat belt "salutes," where an officer tugs on his/her shoulder belt in a "thumbs up" manner as a reminder to an unprotected motorist to buckle up, (2) a modified incentive program whereby properly restrained local motor vehicle drivers can win prizes when spotted by police (e.g., through seat belt or license check points or through the recording of license plate information), and (3) comprehensive public information and education (PI&E).

There is good reason to proceed with the evaluation of a non-sanction type of program. From three different sources -- a statewide survey, brainstorming at luncheons for police and sheriffs, and a series of statewide traffic records workshops attended by representatives of the various N.C. law enforcement agencies -- HSRC has found that local police agencies give varying enforcement attention to the North Carolina adult seat belt and child restraint laws. Officers feel more comfortable in issuing citations to violators of the State's Child Passenger Protection Law because they feel parents should take the responsibility for safeguarding children who cannot protect themselves. However, officers' attitudes regarding issuing citations to violators of the Seat Belt Law are often quite different. Discussions have revealed that some officers are not inclined to enforce the Seat Belt Law because of: (1) a perception of little cooperation from the courts, (2) the feeling that detection and enforcement is difficult, (3) their personal belief that adults should have the right to choose to wear belts, (4) their own skepticism about the effectiveness of belts, and (5) a view that there are more important laws to enforce.

Police enforcement efforts are also held back by community attitudes. Particularly in smaller towns where the officers are well acquainted with many townspeople, there is more difficulty in enforcing these laws than others such as drunk driving or speeding. In part this stems from the persistent view that seat belt laws are "different" from other laws. Some citizens (as well as some police) feel that it is acceptable not to buckle up, and believe that enforcement of these laws intrudes on basically law-abiding citizens. And finally, many North Carolina police officers have indicated that enforcement of the law is strictly dependent on the priority that their police chief places on enforcement, regardless of how they personally feel about the law.

With these factors in mind, this demonstration program and evaluation was set up with belt use as the main dependent variable. The comprehensive GHSP statewide occupant restraint public information activities were to continue as usual, and the intensive demonstration program activities were viewed as beyond the level of the ongoing state program. The main assessment question was whether the demonstration program effectively enhanced the basic state program in the local sites.

Background

North Carolina Occupant Protection Laws

The North Carolina Child Passenger Protection Law went into effect July 1, 1982 and was strengthened in July 1985. Currently all children under age six must be buckled up when riding in cars required to have seat belts. Children under age three must be properly restrained in child safety seats. Children ages three to six must be in safety seats or car seat belts. The law covers all drivers of children. Violators are subject to a fine not to exceed $25.00 (in addition to court costs). Charges are dropped if the child is less than age three and proof is presented at trial that a safety seat has been acquired since the violation.

North Carolina's Seat Belt Law became effective on October 1, 1985. The law requires all drivers and front seat occupants of vehicles subject to Federal Motor Vehicle Safety Standard 208 to use a lap belt or lap and shoulder belt while the vehicle is in forward motion on a street or highway. Violators were issued warning tickets during a fifteen-month grace period. As of January 1, 1987 violators have been subject to a fine of $25.00.

North Carolina Usage Rates

Police-reported safety seat and seat belt usage rates for children under age six involved in motor vehicle accidents and covered under the state's Child Passenger Protection Law reached a record high of 86 percent for 1989 compared to 17 percent in 1982 (Hall, Lowrance, Suttles and Orr, 1990).

In evaluating the effectiveness of the Seat Belt Law, statewide observational surveys of drivers and front seat passengers have been conducted both prior to the law and at intervals throughout the warning and citation phases (Reinfurt, Campbell, Stewart and Stutts, 1988). The results of these surveys showed a remarkably consistent 45 percent driver usage rate throughout the warning phase of the law, in contrast to a baseline rate of 25 percent. At the onset of the citation phase, North Carolina drivers recorded the highest statewide seat belt usage rate in the country up to that point. Seventy-eight percent of 15,847 drivers were observed wearing seat belts at 72 sites across the State. One year later a January 1988 survey reflected a tapering off to slightly above 60 percent. Since that time, overall belt use by drivers has

remained close to 60 percent (Figure 1.1 taken from Reinfurt, Weaver, Hall, Hunter, and Marchetti, 1990).

Effects of the North Carolina Child Passenger Protection and Seat Belt Laws on Injuries

Through a combination of public information and education (PI&E) and enactment of two occupant protection laws, North Carolina has seen favorable reductions in both fatalities and injuries to children and adults. The use of safety seats and belts has prevented approximately 390 fatal and serious injuries among 0-5 year-old children in North Carolina from July 1982 through June 1990 (Hall, et al., 1990).

Using time series analysis, the North Carolina Seat Belt Law results show an 11.6 percent reduction in fatalities, 14.6 percent reduction in serious or worse injury, and 11.6 percent reduction in moderate or worse injury. These reductions may be attributed to the implementation of the Seat Belt Law, since similar decreases have not been seen either for motor vehicle occupants not covered by the law or non-occupants of motor vehicles (pedestrians, bicyclists, etc.). Recent time series analyses show the continuation of these earlier trends, and estimates of injury and fatality reductions for the period January 1987 through June 1990 that are attributable to the belt law indicate 509 fewer fatalities, 5,742 fewer serious injuries, and 4,360 fewer moderate injuries (Reinfurt, et al., 1990).

Research on belt effectiveness indicates that, with full compliance, belts are capable of producing a much greater casualty reduction than what has been observed (Campbell, 1984; Hedlund, 1985; Evans, 1986). Belt effectiveness in reducing death is in the range of 40 to 50 percent. However, these levels are unlikely to be reached because North Carolina's belt law does not apply to all occupants, and furthermore, not everyone "buckles up." Additionally, less quantifiable factors tending to suppress the effectiveness estimate include the facts that: (1) North Carolina's population and driving mileage continue to grow, (2) significant changes in the economy exercise a considerable influence on traffic deaths, and (3) there is scientific evidence that drivers with the highest crash risk are the ones least likely to "buckle up" (Reinfurt, Campbell, Stewart and Stutts, 1987; Hunter, Stutts, Stewart and Rodgman, 1988).

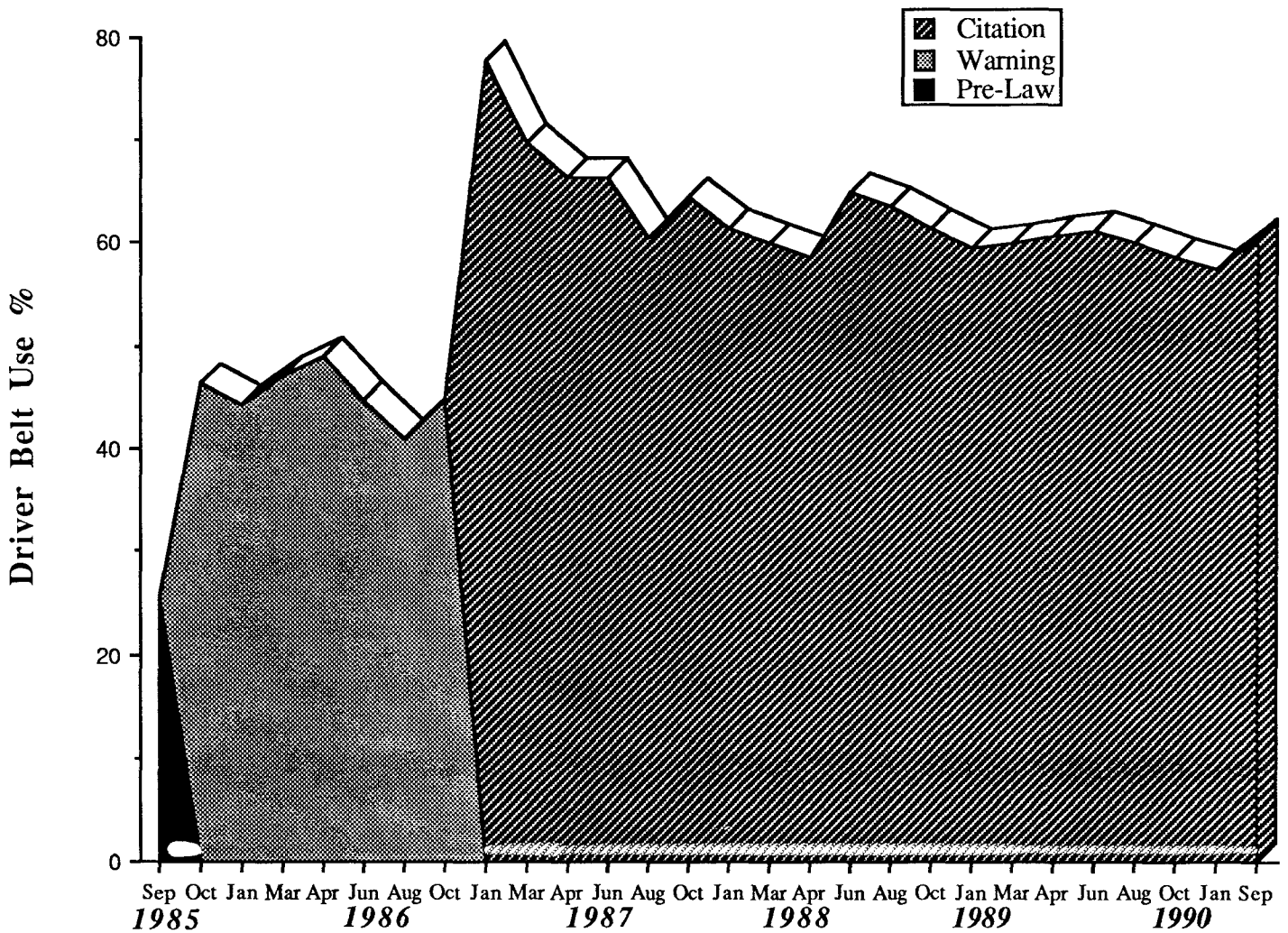


Figure 1.1. Estimated statewide driver seat belt usage rates.

Statewide Enforcement Experience

The State Highway Patrol is committed to enforcing both the Child Passenger Protection Law and the Adult Seat Belt Law. Available information indicates that enforcement levels are lower and more variable for local police departments and county sheriffs, especially in regard to the Adult Seat Belt Law.

The North Carolina Seat Belt Law authorizes an officer to stop and cite a motorist on the basis of a belt law violation alone (i.e., primary enforcement). During the warning phase of the law, the N.C. State Highway Patrol issued an average of 9,666 warnings each month, representing a considerable educational effort. The Patrol's level of issuing actual citations for failing to wear a seat belt started modestly but has increased over the last few years as shown by the following monthly averages:

1987	3,135 citations per month
1988	5,340 citations per month
1989	7,285 citations per month
1990	8,966 citations per month (through June 1990).

These numbers reveal a strong commitment to enforce the seat belt law (Reinfurt, et al., 1990).

Through the first four months of the law's enactment, survey results of local law enforcement agencies suggested an overall modest level of enforcement by the local police departments and a low level of enforcement by the county sheriffs. Subsequent surveys have continued to show generally low to moderate levels of enforcement at the local level, but with considerable variability among the various enforcement agencies (Reinfurt, et al., 1990).

There is no question that enforcement affects compliance of any seat belt law, with the Elmira, New York experience being a good example. Nonetheless, given the difficulty of enforcing the belt law at the local level, and especially in small communities, it was felt that the evaluation of an upbeat, non-sanction enforcement program could provide valuable knowledge, and thus was the emphasis of this demonstration.

Project Description

The concept of this project was to generate supplementary police activities of a non-enforcement nature in order to increase overall seat belt

use in a local community. These activities were additional, intensive efforts beyond the activities typically associated with the GHSP's basic occupant restraint program. The main elements involved: (1) use of seat belt "salutes", (2) a relatively small-scale incentive program, and (3) extensive use of PI&E. The key outcome variable that was measured was the belt use in the community (overall and by race, sex, and vehicle type) before, during, and after the demonstration activities, as compared to the belt use in a comparison site.

The seat belt salute involved police officers signalling unrestrained motorists by tugging on their shoulder belt and making a "thumbs up" sign to indicate the person should buckle up. In addition, positive reinforcement was given to motorists already restrained (including children using belts and/or child restraint devices) by the "thumbs up" signal to indicate appreciation for the fact that they are "buckled up." The positive reinforcement could be done not only while riding in a squad car but also in other situations like traffic control when the officer was on foot (i.e., a simple "thumbs up").

The incentive program was designed so as not to constitute an appreciable workload on the officers. We originally envisioned a program where officers would record a prescribed number of license plate numbers of vehicles in which the adults and/or children were "buckled up" (e.g., five license plates per officer per shift). When a certain number of observations were accumulated, a drawing would be held and one or more winners would receive prizes from local merchants such as free restaurant meals. Although one of the departments did incorporate some drawings for prizes in their program, both preferred using inexpensive prizes like T-shirts and hats with project theme and logo for distribution at community presentations or at seat belt/license check points in traffic.

These non-enforcement activities were accompanied by extensive publicity. Our past experience with seat belt incentive programs and other occupant restraint promotions gave us confidence that radio and television stations and local newspapers would participate, and such was the case (see Appendix A for specific examples).

We felt the demonstration program had the best chance of success in a relatively small community with population ranging from 15,000-30,000, where "getting the word out" would not be a formidable task. However, we also had the resources to try the concept in a second community, and we thought a

considerably larger location would provide an interesting comparison. Thus, two communities in the western Piedmont area of North Carolina were chosen as experimental sites. Albemarle is a small textile-oriented community with a population of 16,000. Gastonia is also textile-oriented but with a population of 60,000. Both had preliminary belt use rates of around 50 percent, or about 10 percentage points below the statewide average. A third site, Statesville, with a mid-range population of 25,000 and a similar belt use rate, was selected as a comparison site. Both experimental sites had active programs for about seven months.

The HSRC staff role was largely advisory, and we worked to obtain support for the project such that the community felt like it "owned" the program. Our goal was to have solid commitment from public officials, community leaders, and the police (from supervisors to officers on patrol), because their attitudes toward restraints and belt wearing habits are examined and viewed by the public. Perhaps most importantly, earlier research had shown that the "rarely" or "never" belt wearers are the groups most likely to notice whether police wear belts (Hunter, et al., 1988).

CHAPTER 2. PROJECT ACTIVITIES

Planning, Site Selection, and Follow-Up Activities

Identifying Potential Sites

Several steps were taken to identify potential sites for the demonstration. Prior police department survey responses to seat belt law enforcement questionnaires were examined to determine which communities had been active. We focused on questions pertaining to the use of seat belt "salutes" and their willingness to use this technique, their overall experience in enforcing the seat belt law, and their past seat belt/child restraint activities. Discussions were also held with persons in the HSRC and GHSP belt "network" to learn more about police departments with the best potential for the type of effort we envisioned. Based on these results, a total of 21 communities in the 15,000-50,000 population range were selected for closer scrutiny.

Two teams then made visits to these communities situated all across North Carolina. Maps were obtained for each community, and local Chamber of Commerce personnel were able to give the teams a quick overview of the layout of the community. Shoulder belt use data were then collected at four to five locations in the community, including a downtown site, a middle class/upper middle class neighborhood, a poorer neighborhood, and one to two other representative locations. We felt an estimate of the shoulder belt use rate was necessary to determine if the implementation of the law enforcement demonstration project would have any "room" for the belt use rate to increase. As might be expected, we found communities with belt use rates both above and below the most recent statewide average.

Final Site Selection

Following the initial visits, an assessment was made of each community and the list narrowed to about a dozen. The chief of police in each location was sent a letter that explained the project and the benefits to the community and asked for an indication of their interest in participating. Given an affirmative response, follow-up telephone conversations were held with either the police chief or another department representative to further assess their combined interest and ability to conduct this project.

The candidate sites were finally narrowed to Albemarle and Gastonia, two communities located in the western Piedmont of North Carolina. Visits were made to both places to meet with the chief and selected personnel who would likely be involved in the project. Many aspects of the demonstration were discussed, and the visit was concluded with a tour of the community.

We were impressed with both departments and decided to work with both. Both chiefs were enthusiastic; the departments had an interest in promoting use of seat belts, and there seemed to be a sense of pride in the community that would translate into a commitment to the project. Gastonia had prior GHSP involvement with a DWI program that would offer good background experience for a project of this nature, and Albemarle had a special enforcement unit created out of a prior GHSP grant. With a population of 60,000 in Gastonia and 16,000 in Albemarle, the selection offered a contrast in size of community. Additionally, both sites were textile-oriented and had a community belt use rate of around 50 percent, based on the preliminary data.

The community of Statesville was then selected as the comparison site. Located about 60 miles from each experimental site, Statesville had a mid-range population of about 25,000, businesses/employers similar to Gastonia and Albemarle, and preliminary belt use of just over 50 percent. A visit with their police chief and his assistant allowed us to explain our overall project and obtain assurance that they were not planning any large-scale seat belt promotion or enforcement activities in the next year.

Follow-up Activities

Having selected the communities, we followed with subsequent visits to finalize seat belt data collection locations. Trial data were collected in about 10 locations in each community. Sites were selected from all pockets of the community, including downtown, strip development, different socioeconomic neighborhoods, etc. to constitute an accurate representation of community belt use. The use rate in all three communities had not changed from the earlier levels (i.e., around 50 percent). The process of computing community belt use rates involves several steps. The details of this computation procedure are provided in Appendix B.

A final step at this stage was to help each experimental community prepare concept statements and project applications for 402 grant funds from the North Carolina GHSP. Because of the importance attached to a national demonstration

project, each experimental community was able to apply for up to $50,000 in 402 funds to help offset expenses associated with the effort. Gastonia received a grant of $46,000 and spent $29,000, while Albemarle received a grant of $43,000 and spent $42,000 on the project.

Program Activities

Overview

The main purpose of the public information and education (PI&E) and other programs conducted by both of the police departments was to sensitize the motoring public to the need for safety belts through positive, upbeat messages presented by law enforcement officers. Although seat belt use is mandated by law, the thrust of the efforts was to make the public feel that they should buckle up for safety reasons, and that it was out of this concern for safety that the police departments were conducting these programs.

Our approach was to work with each of the departments in developing an overall PI&E plan for the project period and provide technical assistance in materials development. We relied on the local agencies to carry out materials production and distribution. Initial planning meetings were held in which the general program elements (e.g., theme, logo, prizes and distribution, local police training about the importance of belts) were defined.

The Gastonia Police Department chose the theme, "Protect the Best - Gastonia Buckles Up," to project the message that Gastonia motorists are "the best" and that wearing seat belts is part of being the best. The slogan and logo was used on all promotional materials. High visibility applications of the logo included banners which were hung at heavily traveled cross-town arteries; brochures, bumper stickers, and fliers that were given out to motorists; and silk-screened T-shirts, key rings, and other items that were given to belted motorists as prizes. The Vince and Larry costumes were purchased and used at promotional events. An advisory board consisting of a cross-section of community representatives such as plant safety directors, a high school principal, a local newspaper editor, the mayor, and others participated in the development of the program. Because of lower belt use rates, the program targeted school students and drivers of pickup trucks for special program activities and relied on several mass distribution efforts to "get the word out" to Gastonia's general population.

Albemarle chose the theme "Albemarle Clicks - Buckle Up and Survive the Drive." This site, which also purchased the Vince and Larry costumes and used them extensively in their program, incorporated the image of the crash test dummies into their logo. Numerous materials were produced bearing the program theme and logo, including banners which were hung at major intersections and signs that were posted at main town entrances. Albemarle produced and distributed brochures, bumper stickers, and fliers, and used T-shirts, key chains and caps as part of their prizes. An advisory board was selected that was comprised solely of police department representatives. Because it is smaller than Gastonia, Albemarle was able to rely more on local media involvement and on direct contact with groups and clubs.

Local Police Training

One of the first steps that was taken in the development of the program was communicating the project activities and objectives to the officers in the police departments, with the goal of winning their support for the project and seat belts in general. A Michigan survey of police attitudes toward seat belt enforcement indicated that the first step toward greater enforcement of the restraint laws can be taken by winning the personal support of officers for these laws (Donohue, Atkin and Tamborini, 1986). To win this support, officers need to be persuaded that not only are restraints effective in saving lives, but that drivers just do not have the freedom to choose to comply. Officers need to be convinced that the majority of drivers support the restraint laws, and that seat belt enforcement is important as a traffic safety priority. Police are most affected by their agency's priority for enforcement and by their own views of traffic safety. Here in North Carolina, many police officers have indicated that enforcement of the law is strictly dependent on the priority that their police chief places on enforcement, regardless of how they personally feel about the law.

For this demonstration, the HSRC principal investigator trained all shifts at both community police departments. The non-sanction approach was explained, and other points of emphasis included the importance for police officers to wear their belt (i.e., their personal risk), the importance for their community that they wear their belt (i.e., proper role modeling), the monitoring of North Carolina's seat belt use rate and the current statewide use level, the current use rate of their particular community, and the complete project time table.

The HSRC video entitled, "The Need for Seat Belts," which features vignettes from police officers across the State who were saved from serious injury in crashes because they were belted, was used with every shift.

Program Implementation

Both programs decided to initiate their activities in November 1989, with the intention of using the high level of interest typically shown by the media and the public regarding safe driving over the holiday period (between Thanksgiving and New Year's Eve) to leverage interest and exposure for the programs. Both programs basically lasted until late June, 1990 (duration of seven months) with Albemarle continuing some activities through the summer. The Albemarle project moved rapidly after the kickoff, while the Gastonia effort was a bit slower to start with many activities coming on board in January and February.

Program Kickoff Events

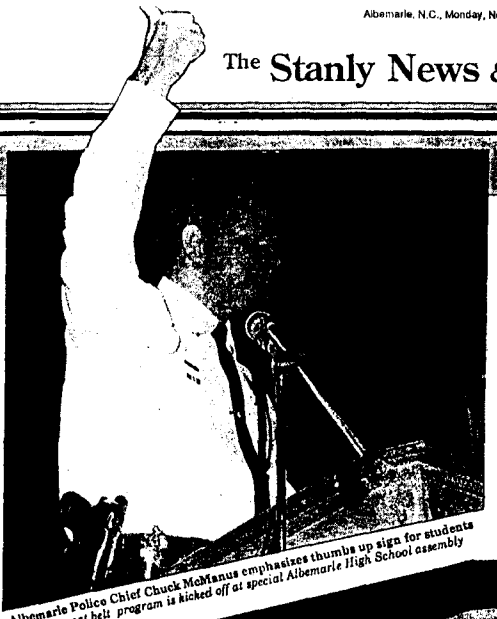
Much activity occurred in preparation for both kickoff events. Local media were briefed on the programs and their support requested. (The Gastonia advisory board included a media representative.) HSRC staff developed logos, brochures, bumper stickers and press kits for inclusion in the events (see Appendix A for examples). The press kits were imprinted with the program logos and contained information about seat belts and the local community programs.

The official kickoff occurred for "Albemarle Clicks" on November 15, 1989, at Albemarle Senior High School. NASCAR driver Kyle Petty was a featured guest, and Chief Charles McManus was the master of ceremonies. William Hunter of HSRC explained the project, and Vince and Larry and McGruff (The Crimestopper Dog) all helped to generate enthusiasm. Kyle Petty made some very appropriate remarks about why belts are so important to everyone. Immediately after the kickoff, a seat belt check point was set up near the police station and campaign literature was handed out by Albemarle police officers, by Vince and Larry, and by McGruff. Banners set up at four locations around the community also helped to spread the message. Television, radio and print media were present at the high school and the check point (see Figure 2.1). HSRC staff felt it was an extremely effective community project kickoff because it drew together town leaders, students, law enforcement officers and the media into a pep-rally-like event that set the tone for the entire program.

Lifestyles

The Stanly News & Press

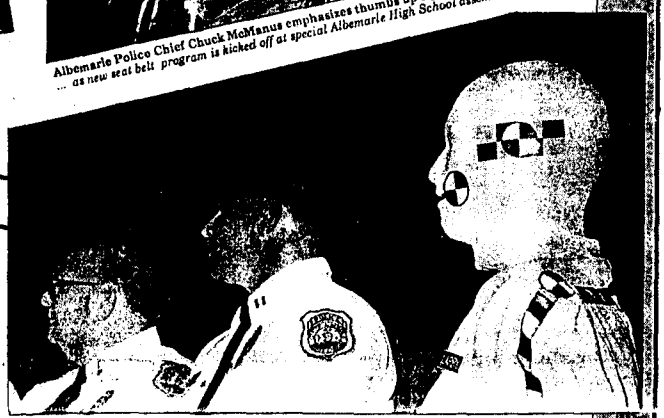
Poster child Taylor Morton
...and Kyle Petty give salute



Albemarle Police Chief Chuck McManus emphasizes thumbs up sign for students
... as new seat belt program is kicked off at special Albemarle High School assembly

Vince, the crash test dummy
...and partner, Larry, will help

Photos by
Marty Bowers



Eyes right! — Asst. Chief Henry Hopkins (L-R), Capt. Matt Cagle and Larry listen intently
...as race car driver and seat belt advocate Kyle Petty tells students the importance of buckling up

Albemarle Clicks!

Buckle Up and Survive the Drive.

By JO ANNE B. EFIRD
SNAP Lifestyle Editor

Buckle up!

Based on surveys taken in Albemarle, almost half the motorists in the city don't.

And the Albemarle Police Department, with a $43,295 grant from the Governor's Highway Safety Program, is out to see that they do.

Using the slogan "Albemarle Clicks — Buckle Up and Survive the Drive" the six-month safety campaign will include banners, contests, visits from Vince and Larry, the crash-test dummies featured on TV, and other activities to get everyone into the seat belt habit.

Six data collectors have been hired through the Stanly County Senior Center and the money they earn will be paid directly to the Senior Center to help with projects there, so that part of the money will benefit Stanly County twice.

The grant will take care of this, as well as prizes for buckled-up drivers, equipment needed for special safety programs and projects, brochures, T-shirts, and other give-aways. The program is 100 percent grant-funded. No city money will be needed.

Vince and Larry were present at Albemarle High School Wednesday when the campaign, one of only two in the state, opened with a kickoff meeting with other such notables present as race car driver and seat belt advocate Kyle Petty, McGruff, the crime fighting dog, and Bill Hunter of the UNC Highway Safety Research Center in Chapel Hill.

Hunter and Petty each spoke briefly, directing their remarks principally to the students in the assembly. Petty told them that nobody ever gets in a race car without a seat belt and urged them to get into the habit in their own cars, because, "It's just common sense."

'We care about your safety'--Chief Chuck McManus

Hunter said that while a driver can do nothing to control the first collision in a crash, the initial impact, he or she can control the second collision, that with objects inside the car, by wearing a seat belt.

Mayor Buddy Holt, council members Troy Alexander, Jack Neel, Judy Holcomb, Jimmy Napier, and Tidus Stanback, were there to lend support. Albemarle Police Chief Chuck McManus served as master of ceremonies. Other guests were Don Nail, program manager for the Governor's Highway Safety Program, and Lauren Manchetti, media specialist for the Highway Safety Center.

Taylor Morton, who posed for pictures in the brochure and who is the official "poster child" of the campaign, was recognized, as well as Capt. Matt Cagle, who is in charge of the campaign, and Assistant Chief Henry Hopkins, of the Albemarle Police department.

Banners announcing the program have been put up at strategic locations around town and seat belt check points have been set up at several places.

The hallmark of the campaign will be the Seat Belt Salute, a tug on the seat belt and a thumbs up gesture. Albemarle policemen will be using this sign throughout the campaign to remind those not buckled up to do so and as a sign of appreciation for those who are buckled up.

Motorists are encouraged to join in the fun by tugging on their belts and giving the thumbs up, too.

From time to time, motorists will be stopped and given prizes for wearing their seat belts. There will be big prizes and small prizes and many chances to win. The only requirement is that you be wearing your seat belt.

"The members of the Albemarle Police Department are enthusiastic about this seat belt campaign," said Chief Charles B. McManus. "We know first hand the value of belts. We see the senseless deaths and injuries caused by crashes, and we see adults and children coming out of serious crashes with little or no injuries because they were belted."

McManus says seat belt use in Albemarle and Stanly County needs to be higher.

"Albemarle Clicks is a positive, fun way to increase seat belt use in this area.

"We care about your safety. If friendly reminders don't get the message across that we're serious about belts, then we will not be shy about writing seat belt citations — but we'd be happier if we could take the fun approach."

A similar program is being conducted by the Gastonia Police Department and data will be collected in both cities to see if belt use is increased. If successful, these programs will be used as models for other cities in the nation to use to set up similar programs.

"Wearing a seat belt is the most important thing you can do to protect yourself in a crash," said Capt. Cagle, captain of special operations for the APD.

"The Albemarle Police Department wants everyone to get into the seat belt habit and to have some fun doing it."

So let's make Albemarle click! Buckle up!

Ptl. J. D. Huneycutt gives Mrs. Helen Harris safety brochure and a thank you
...for using seat belt. Such scenes will be common in Albemarle during campaign

Figure 2.1. Sample of media coverage of the Albemarle program kickoff.

The "Protect the Best" kickoff for Gastonia was held on November 20, 1989, at the City Council Chambers in City Hall. The kickoff was a press conference and included remarks by Chief Jack Postell, William Hunter of HSRC, Paul Jones of the NC GHSP, Romell Cooks of the NHTSA regional office in Atlanta, and featured guest Mike McKay. McKay is a popular weatherman for a Charlotte, N.C. television station (WBTV) and has been a seat belt spokesperson since surviving a severe crash by being belted. Master of ceremonies was Captain Danny Cochran, project coordinator for the Gastonia Police Department. After the press conference, a seat belt check point was set up outside City Hall and campaign literature and T-shirts handed out. Vince and Larry, McGruff, and local officers participated. A number of local print media were present (see Figure 2.2), but no local television stations. News staff for Mike McKay's station had a conflict and could not cover the event. Unfortunately, McKay's involvement in the kickoff probably affected the coverage other stations gave the event. Because Gastonia's population is larger and less contained than Albemarle's population, television coverage was important and its absence diminished the potential effectiveness of this kickoff.

Core Activities

The two programs planned activities to extend over the entire seven-month period and used a combination of general activities and efforts aimed at specific target groups. Some activities were designed to either coincide with community events or to "piggyback" with events that would enhance exposure. Figures 2.3 and 2.4 show a breakdown of events and exposure by month for both programs.

Many similar program activities were employed at both sites. The following is a summary of public information activities used by both programs:

Seat Belt Salutes - Both programs used the seat belt salute to encourage unbelted motorists to buckle up or as a sign of "thank you" to motorists who were wearing their belts. The Albemarle police officers were more comfortable with the salutes and received positive feedback from motorists. Officers in Gastonia were less comfortable with the salutes and used them much less frequently.

Seat Belt Check Points - Both departments used seat belt check points throughout the life of the programs. Traffic would be stopped by the police and randomly selected belted motorists given a small prize such as a key chain as a reward for being buckled up. All motorists received program materials such as a brochure or bumper sticker. This activity was

'Buckle up' Gastonia tells drivers

City hopes program will boost compliance

By David May
Gazette Staff Reporter

GASTONIA — Gastonia city police and officials kicked off a new seat belt program Monday, hoping the idea of "buckling up" will fasten in everybody's mind.

Gastonia residents will be exposed to the program theme, "Protect The Best — Gastonia Buckles Up" over the next six months. The program, one of only two in the state, is financed through a grant from the governor's Highway Safety Program.

Gastonia and Albemarle, the other city in the program, will collect data on seat belt useage and, if successful, the programs will be used as models for other cities to promote vehicle safety.

The Gastonia program will include school contests, banners hung across roadways and prizes for motorists who

Please see **BELTS/6B**

Jeff Melton/The Gazette

Vince The Dummy reminds a motorist to buckle up.

BELTS

FROM 1B

comply with the law. Police officers will encourage belt use by tugging on their seat belts and giving a "thumbs up" to those who use their car seat restraints.

Statewide, 60 percent of all motorists are buckling up regularly, while in the city compliance is about 50 percent.

A program goal is to bring compliance to about 70 percent. Under state law, all drivers and front seat passengers are required to wear seat restraints. Children up to age three must ride in a safety seat or booster seat. Children up to age six must be fastened by a safety seat, booter seat or seat belt.

A press conference at City Hall Monday kicked off the program and featured Mayor James B. "Jick" Garland, Police Chief Jack Postell, program coordinator Capt. Danny Cochran, Bill Hunter of the UNC-Chapel Hill Safety Research Center, Paul Jones, director of the governor's Highway Safety Program and Romell Cooks of the National Highway Traffic Safety Administration.

Postell said compliance with the 1985 law has decreased over the past couple of years. He said some resist the law because they feel it deprives them of a freedom of choice. "People have to want to wear their seat belts," he said. "This is aimed at enticing motorists to feel comfortable wearing their seat belts."

One way to increase compliance is through strict enforcement. But that is not generally a "pleasant" means, for police or citizens, said Hunter. Instead, the program is meant as a fun way to draw attention to the safety features seat belt usage provides.

"Certainly, there will be lives saved and injuries averted as a result of this program," he said.

Also on hand Monday to start the program were Vince and Larry, the crash-test dummies popularized on television and McGruff, the crime fighting dog. They assisted police in a demonstration outside City Hall, giving away bumper stickers and "Buckle Up" T-shirts to motorists seen wearing their seat belts.

Figure 2.2. Sample of media coverage of the Gastonia program kickoff.

ALBEMARLE
PUBLIC INFORMATION AND EDUCATION PROGRAM
November 1989 - September 1990

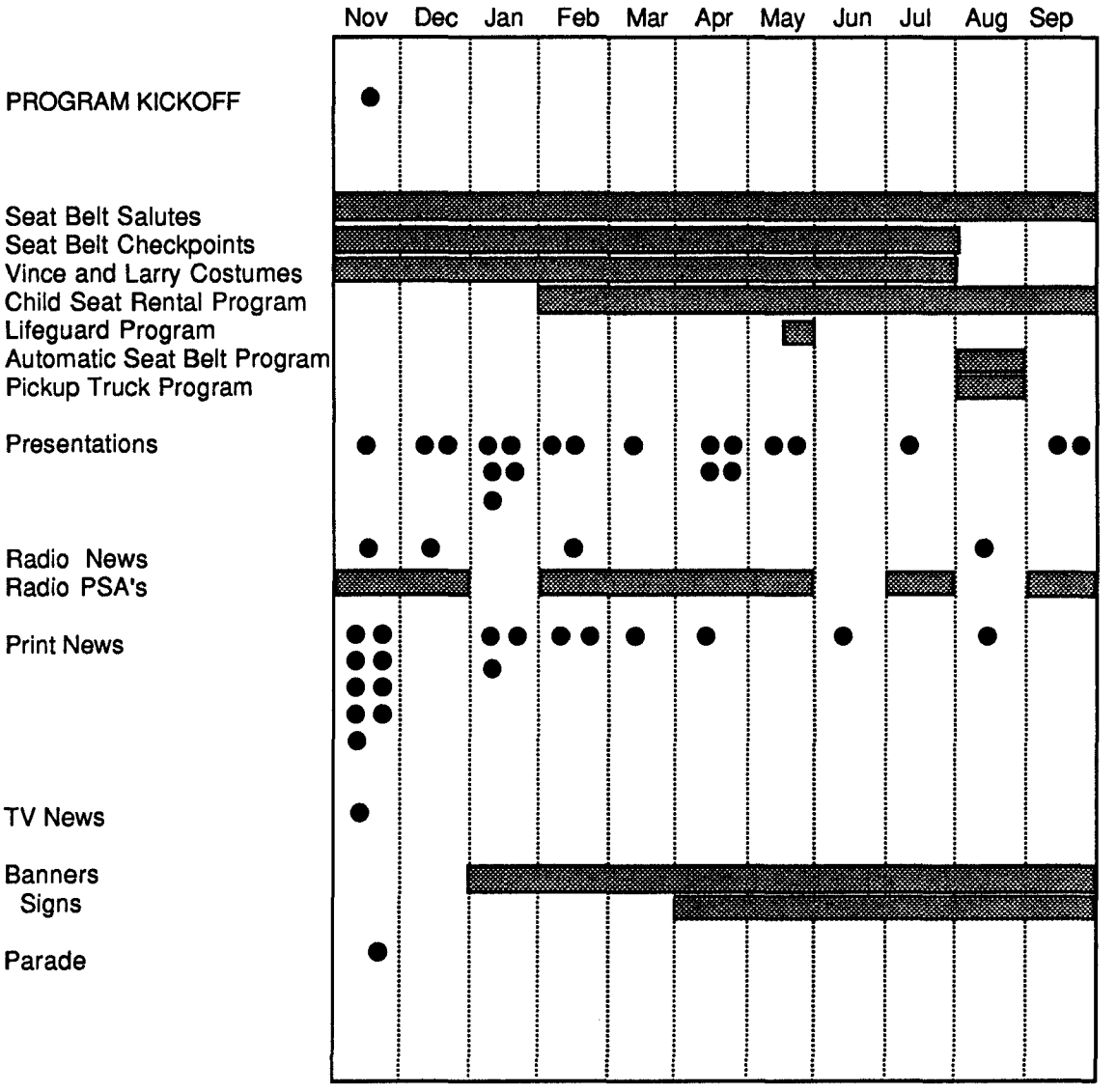


Figure 2.3. Albemarle public information and education program.

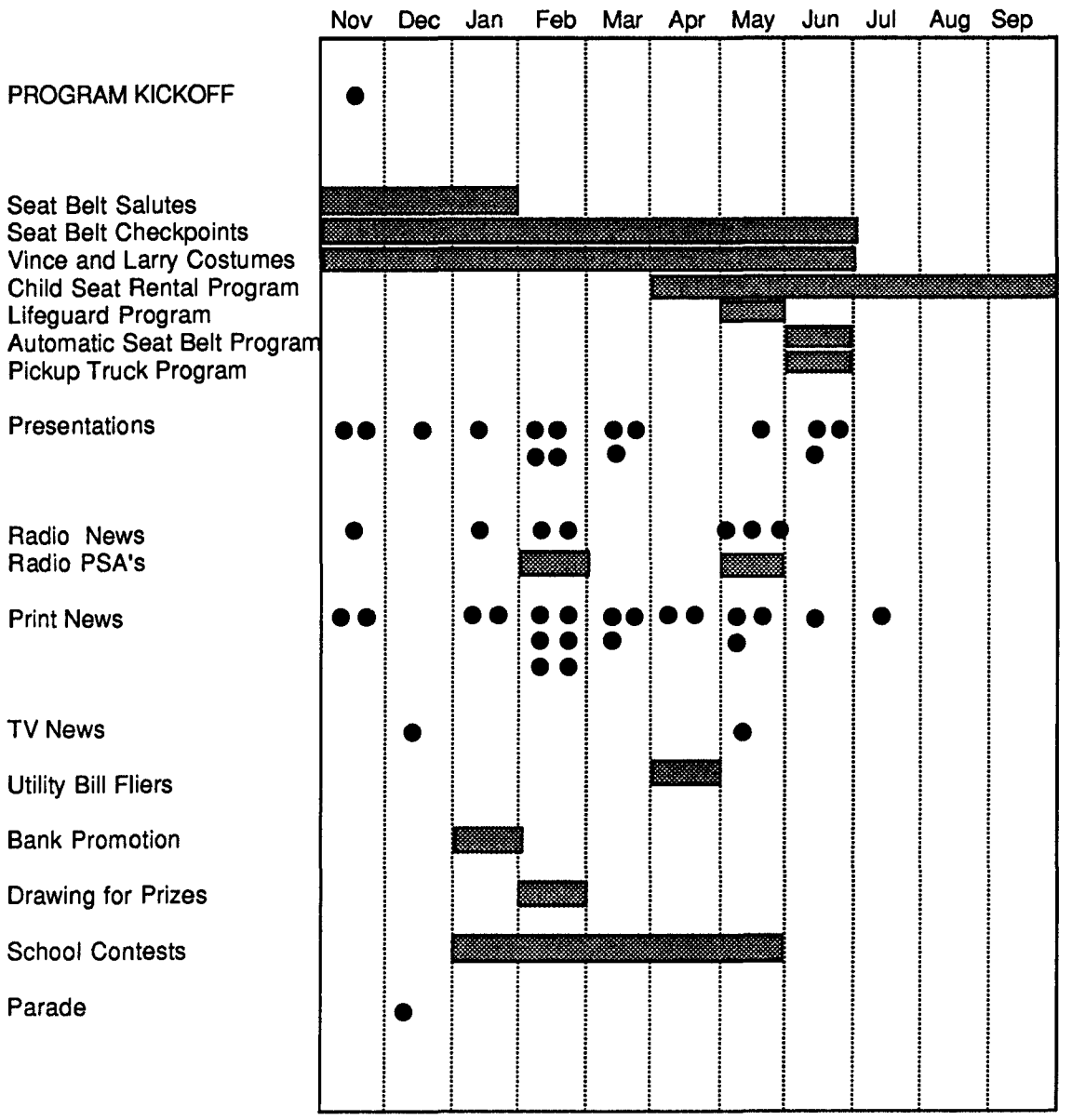


Figure 2.4. Gastonia public information and education program.

well received by the public and the media, and the officers reported that they enjoyed the interactions with the public.

Use of Vince and Larry Costumes - The crash test dummy characters were excellent components of both programs. They gave the campaigns high visibility, were easily recognized as seat belt advocates, were creatively used as part of parade floats and presentations, were photographed with children at mall displays, and made good visuals for the media.

Child Seat Rental Programs - Both departments purchased child safety seats and initiated rental programs that received good media coverage.

"Lifeguard" High School Programs - Albemarle Senior High School and Gastonia's two high schools, Hunter Huss and Ashbrook, each conducted programs based on the "Lifeguard" concept. This program involved student groups monitoring belt use in school parking lots. The students turned the parking lots into beach settings with a student lifeguard on duty on a lifeguard stand or chair. Students leaving the parking lot would get a warning whistle for not wearing a seat belt, or drivers of randomly stopped vehicles would receive beach-related prizes such as inexpensive neon sunglasses or frisbees for being buckled up. The students thought the idea was fun, and it drew good print, radio and TV media coverage.

The program was active for 3 to 4 weeks at Gastonia's two high schools but only for two days at Albemarle Senior High School (approval from student advisor came late in the school year). Belt use rates increased from 40 to 78 percent at the Gastonia Ashbrook High School while the program was in place. These data were collected by students in a leadership class trained by the Gastonia Police Department coordinator. HSRC staff had been promoting this lifeguard concept for some time and were very pleased that this activity was fun for participants as well as successful in significantly raising the belt use for high school students in Gastonia.

Automatic Seat Belt Program - A program was developed to combat the problem of motorists forgetting to buckle their manual lap belts in cars equipped with motorized shoulder belts and to remind persons with air-bag-equipped cars that they, too, need to buckle up. Fliers were developed to educate the drivers and possible purchasers of vehicles equipped with these automatic restraints as well as to promote the police programs. (The fliers were designed and printed by HSRC as part of a contract requirement to provide education about automatic restraints.) Police explorer scouts in each community visited car dealerships to become familiar with cars equipped with "automatics." Besides leaving a supply of fliers with each dealer and asking them to place a flier on cars equipped with "automatics," the scouts also went to various parking lots in the communities and placed fliers under the windshield wiper blade of these specially equipped cars.

Pickup Truck Program - This effort was similar to the Automatic Seat Belt Program. Fliers were developed by HSRC that targeted pickup truck drivers, a group which has consistently had much lower belt use rates than drivers of passenger cars, both in the program cities and across the State. These fliers, which gave reasons why pickup truck drivers need to

buckle up, were placed on windshields of pickup trucks in parking lots by explorer scouts. Gastonia distributed many automatics and pickup truck fliers at a special NASCAR promotion at a major mall.

Media - Both communities actively pursued media coverage from the area newspapers, TV and radio stations. Both received good coverage from the newspapers and hard news and public service coverage from local radio stations.

Albemarle had one local county newspaper that was an important vehicle for "getting the word out," and the local radio station, primarily through the commitment of the "morning man," also provided excellent support. At least nine different radio public service announcements were produced and given considerable play. While only a small segment of the Charlotte TV media market, Albemarle did receive TV coverage for their kickoff event which featured NASCAR driver Kyle Petty.

The local paper in Gastonia provided coverage but not to the extent seen in Albemarle. Local radio stations also had some participation; however, since both of these media outlets compete with the newspaper and radio and TV stations in nearby Charlotte (a thriving city of over 300,000), it was harder to keep the Gastonia community informed about the program in this setting. At least two radio public service announcements were produced and TV coverage included the high school "Lifeguard" promotion and police participation in a talk show.

In addition to the activities listed above, both jurisdictions conducted special activities tailored to their communities (see Figure 2.5). Albemarle conducted numerous presentations and programs at the elementary schools, the YMCA, churches, the senior citizen center, county fair, scout meetings, health fairs, malls, civic club meetings, child care centers, and other community events. Metal traffic signs promoting "Albemarle Clicks" were designed and mounted at busy roads leading into the city limits. A remote control talking car was used to teach safety programs to children, and polaroid photographs of Vince and Larry posing with children was used as a promotion at special events. Clearly Albemarle's setting allowed for a local emphasis and direct contact with many of the community's individuals and groups.

Gastonia had to use strategies with more mass audience emphasis to reach its larger and less contained population. Fliers were distributed to every household in the surrounding area in the April 1990 utility bills. A promotion was done with banks using their drive-up windows to distribute brochures and incentives. A contest involved giving belted motorists who were stopped in seat belt check points entry cards to win prizes such as tickets to the local professional basketball (Charlotte Hornets) games. Numerous programs were

Program Elements Used by both Albemarle and Gastonia

- Seat Belt Salutes
- Seat Belt Check Points
- Vince and Larry Costumes
- Child Seat Rental Programs
- "Lifeguard" High School Program
- Automatic Seat Belt Program
- Pickup Truck Program
- Print and Electronic Media
- Banners, Brochures, Bumper Stickers

Strategies Used by Albemarle

- Presentations and Programs to:
  - Schools
  - YMCA
  - Churches
  - Senior Citizens
  - Fairs
  - Civic Clubs
  - Child Care Centers
- Metal Traffic Signs
- Talking Car Safety Programs
- Polaroid Photos with Vince and Larry

Strategies Used by Gastonia

- Utility Bill Fliers
- Bank Drive-up Window Promotions
- Drawings for Prizes
- School Poster Contest
- "Adopt a Cop" Program
- NASCAR Display
- High School PSA Contest
- Booth with Scouts

Figure 2.5. Program elements and strategies used by the demonstration programs.

designed to reach young school students, including the "Adopt-A-Cop" program, an elementary school poster contest, and a high school PSA contest. The police department used the strategy of reaching the public through various promotions at large shopping malls. A big promotion at the largest local mall involved a display that "piggybacked" onto the first annual "Pit Stop for Kids" sponsored by NASCAR. Almost 200,000 people visited the NASCAR and seat belt displays.

June 1990 marked the end to "intense" promotion by both campaigns, although there was no official end to either campaign. Throughout the seven-month program period, the HSRC staff brainstormed about project ideas and offered suggestions and support to the local programs. Both departments were very receptive to the continual flow of ideas and implemented a variety of the suggestions.

Project Follow-Up

Several months after formal project activity ended, the HSRC principal investigator visited both experimental communities to learn more about the mechanics of each project, how the project was accepted by local police, positive and negative outcomes, etc. Discussions were held with the police chief, the project coordinator and support staff, and members of a patrol shift. The interviews were insightful, and findings are covered in the sections on results (Chapter 3) and discussion (Chapter 4).

CHAPTER 3. METHODOLOGY AND RESULTS

Overview of Methodology and Data Collection Procedure

The general project methodology was described in Chapter 1 and basically involved a before/after design with comparison site. There were two experimental sites (Albemarle and Gastonia) utilizing the non-sanction program and one comparison site (Statesville) with no special program. Shoulder belt use data were collected throughout the project and served as the main dependent variable. For the intersections comprising the sample locations in each community, driver shoulder belt use data were obtained for all passenger motor vehicles equipped with shoulder belts. Figure 3.1 is a copy of the data collection form. The data were coded separately for passenger cars and minivans (hereafter referred to as "passenger vehicles") and for pickup trucks, vans, utility vehicles, and other vehicles (referred to as "pickups"). In addition to belt use, race and sex of the driver were also collected because these variables have been linked with differences in belt use in prior studies.

Because the experimental sites of Albemarle and Gastonia are located about three hours from HSRC, we elected to have the local police hire data collectors who would be trained by HSRC. This approach was quite successful in Albemarle, where a group of people active in the local Senior Citizens Center served as the data collectors. They were trained by HSRC staff and showed excellent agreement in their data when tested. HSRC staff also occasionally gathered samples of data in Albemarle to confirm the current use rate determined by the local data collectors, and the match was always excellent. The local data collectors were dedicated and reliable individuals who collected data every two weeks until near the end of the project, when a three-week interval was used. Besides their data collection role, these people were well known in the community and gave the project much visibility.

The Gastonia police were never able to obtain suitable local data collectors, although several outlets were explored, including the local community college and police auxiliary organizations. Just prior to the "Protect the Best" kickoff, accident report form coders from within the police department were trained by HSRC staff to obtain data, but their participation was designated as optional by the local police and to be handled with supplemental pay. Largely because of the pressure of keeping up with the daily

Albemarle Seat Belt Observation Form

Site No. ___ Observer ___ Month ___ Day ___ Year ___ Start Time ___ Finish Time ___ Start Vol. ___ End Vol. ___ Unknown ___

WHAT	Cars with headrests or high seatbacks (1968 or later models). 1976 or later model pickup trucks.
WHO	Drivers wearing shoulder belt across shoulder, not under arm.
HOW	Record observation as: 1 White Male 3 Non-white Male 2 White Female 4 Non-white Female Circle the number when person is belted. Omit observation if unsure of belt status, race or sex.

PASSENGER CARS, MINIVANS

(10) — — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
(50) — — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
(100) — — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
— — — — — — — — — —
(150) — — — — — — — — — —

	WM	WF	NWM	NWF	TOTAL
Belted					
TOTAL					
%					

PICKUPS, VANS, UTILITY VEHICLES

— — — — — (5)
— — — — —
— — — — —
— — — — —
— — — — — (25)
— — — — —
— — — — —
— — — — —
— — — — —
— — — — — (50)
— — — — —
— — — — —
— — — — —
— — — — —
— — — — — (75)

	WM	WF	NWM	NWF	TOTAL
Belted					
TOTAL					
%					

Figure 3.1. Sample data collection form.

accident forms, these coders elected not to continue as data collectors. Because no other possibilities materialized, all the Gastonia data were collected by HSRC staff. While this alternative produced reliable data, the disadvantage was that HSRC staff could only be available about once a month, and the project visibility provided by frequent data collection by locally recognizable individuals was absent in Gastonia.

Additionally, HSRC staff collected all of the data in the comparison site of Statesville. Frequency of collection here was also about once a month. For the two experimental communities, the belt use data were collected before, during, and after the intervention. Without a special program, such periods were absent in Statesville. In all three communities, the data were obtained over an approximate 80-week period with about half the data collected at peak traffic periods, and the rest at off-peak periods on each occasion. HSRC developed schedules to randomize the selected intersection locations by peak versus off-peak time periods.

Results

The data are examined first using a very detailed descriptive analysis and then, more rigorously, fitting categorical regression models. The results are provided in the remainder of this chapter.

Descriptive Analysis

Overall Belt Use Changes by Community. Both experimental communities experienced an increase in the driver shoulder belt use rate (hereafter referred to as belt use rate) during and after the non-sanction program. Initial data were collected in March 1989, followed by other "before" data points in May and October of 1989 (prior to the November kickoffs - Week 35 or November 15th in Albemarle and Week 38 or November 20th in Gastonia). Figure 3.2 shows the trends in belt use rates for all three communities throughout the study. For all vehicles combined (Figure 3.2a), the plot shows a substantial rise in the belt use in Albemarle and a lesser increase in Gastonia. The comparison community of Statesville had a higher belt use rate to begin with and stayed relatively flat during the data collection except for an increase at the end (see discussion below). The same basic pattern holds for passenger vehicles (Figure 3.2b) and pickups and other vehicles (Figure 3.2c).

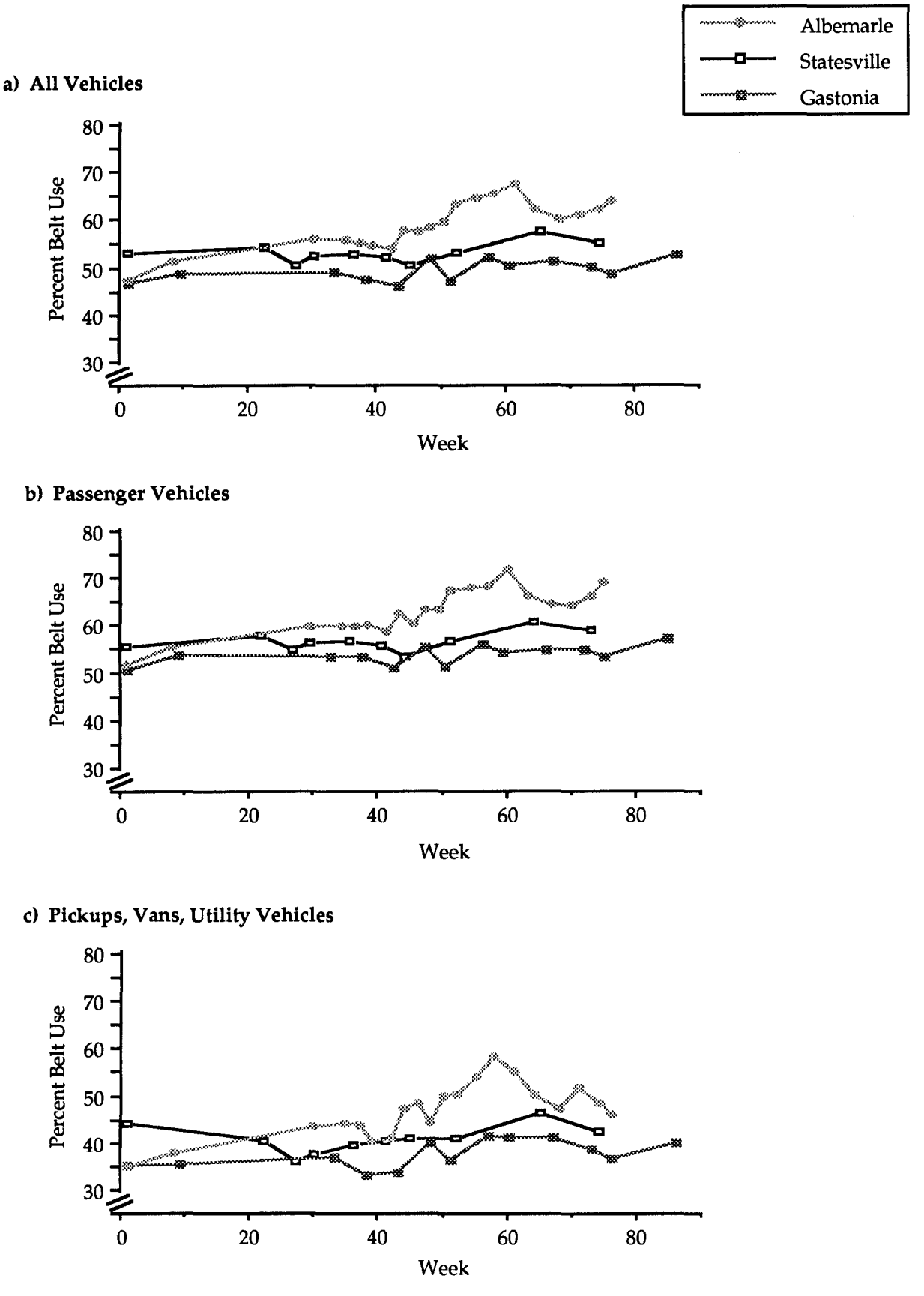


Figure 3.2. Community belt use rates.

More detail for each community can be seen in Figure 3.3. During the before period, the Albemarle belt use for all vehicles increased from 48 to 56 percent (Figure 3.3a), while the Gastonia belt use increased from 47 to 49 percent (Figure 3.3b). The Albemarle community use rate remained around 54-56 percent after the kickoff and then gradually rose to a peak value of 68 percent in Week 61 (May 1990). This was followed by a slight decrease and then a rise back to 64 percent for the last data point in Week 76 (September 1990). The changes in the plots for both the passenger vehicles and the group of pickups, vans, and utility vehicles were quite similar over time. Only in the after period was there much of a divergence, where the pickup belt use was continuing to decrease.

During and after the program in Gastonia, the overall belt use rate fluctuated between 46 and 53 percent (Figure 3.3b). The last data point, collected in Week 86 (October 1990), was the peak value (just over 53 percent). As with the Albemarle data, the passenger vehicle and pickup belt use generally tended to vary in concert.

The Statesville comparison site data collection was started in June 1989, and the initial overall belt use rate was 53 percent (Figure 3.3c). The community belt use hovered in this vicinity for about one year, and then rose to around 57 percent near the end of data collection (mid-August to late October 1990 - Week 65 to Week 74). This rise in belt use was almost surely associated with a change in their seat belt enforcement policy in the community. As documented in Table 3.1, the Statesville police wrote very few seat belt citations per month in 1989 and through March of 1990 (an average of about six per month). Over the next seven months, the number of citations increased dramatically, peaking at 69 in May 1990. During this intensive enforcement period, the police were operating almost exclusively in community areas of lower socioeconomic status where drug use was known to be a problem. Since North Carolina has a primary seat belt enforcement law, police were using the failure of front seat occupants to wear belts as a means of stopping vehicles and then observing for drugs. Besides word-of-mouth in the community, the seat belt citations, along with other citations, were documented in the local newspaper. Since the highest belt use rates coincided with this active enforcement phase, it seems apparent that there was a strong association.

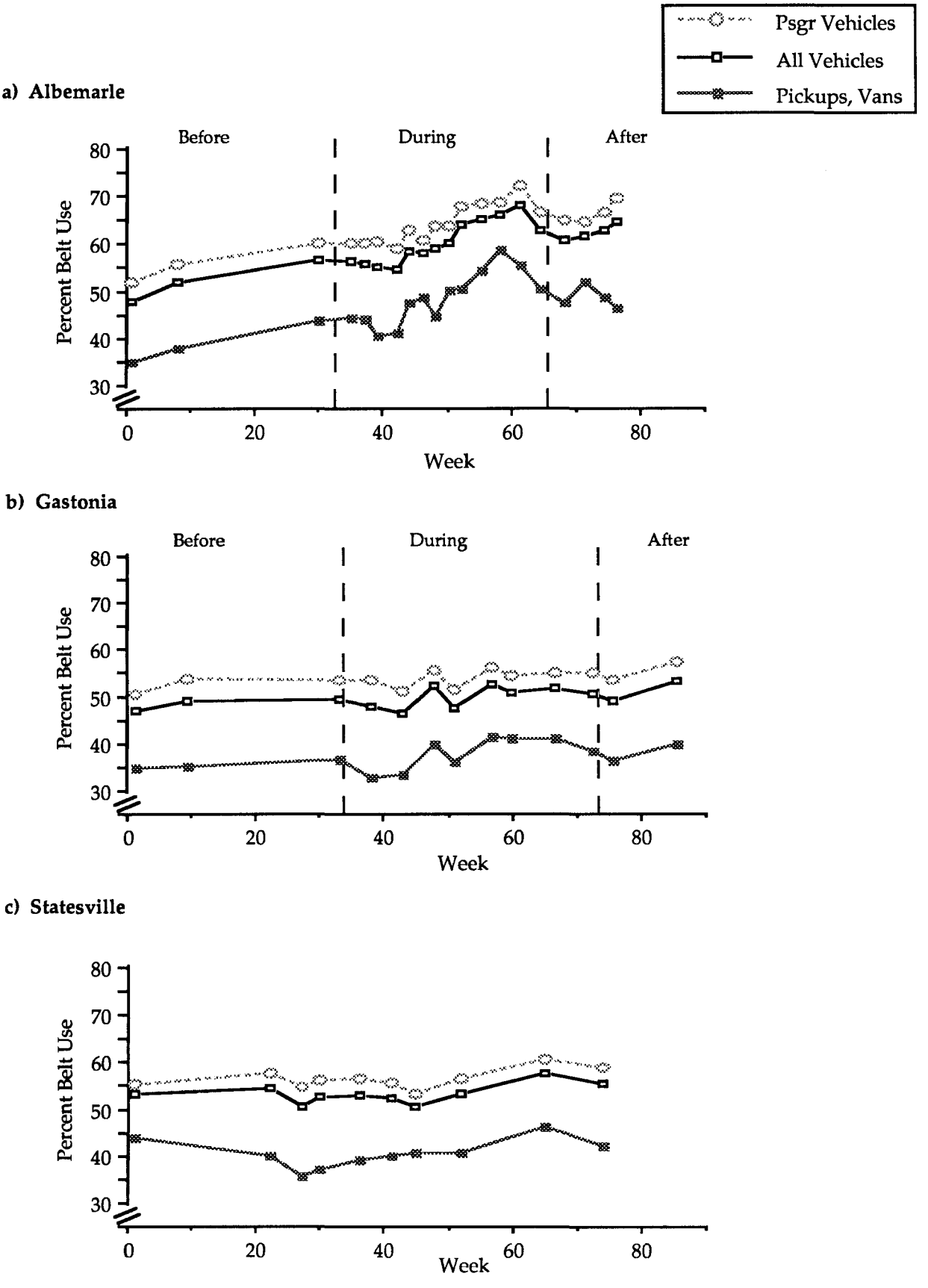


Figure 3.3. Belt use by vehicle type.

Table 3.1. Number of monthly seat belt citations for each community.

		Number of Seat Belt Citations		
		Albemarle	Gastonia	Statesville
PHASE				
	1989			
	Jan	-	18	11
	Feb	-	21	4
	Mar	-	7	7
	Apr	-	19	9
	May	5	6	3
BEFORE	Jun	9	4	5
	Jul	4	0	13
	Aug	1	4	12
	Sept	4	1	1
	Oct	6	1	3
	Nov	5	3	6
	Dec	10	2	4
	1990			
	Jan	2	1	3
DURING	Feb	1	4	3
	Mar	2	3	7
	Apr	3	4	42
	May	1	3	69
	Jun	1	6	47
	Jul	11	2	27
AFTER	Aug	1	5	31
	Sep	3	10	29
	Oct	-	8	20

The experimental communities of Albemarle and Gastonia were asked to stay at about the normal seat belt citation level during the program, since the emphasis was on "soft" enforcement. Both communities adhered to the request (Table 3.1).

Belt Use by Sex of Driver. The growth in the belt use rate in Albemarle was a function of increases for both male and female drivers (Figure 3.4a). The variation in belt use over time was virtually identical for the two groups, but with the female use rate consistently higher than the male use rate, as is generally the case. The peak use rate for female drivers was 76 percent and for male drivers 58 percent -- both in Week 61 (May 1990).

The same tendency was true in Gastonia (Figure 3.4b), where the female driver belt use peaked at 62 percent (last data point collected) and the male

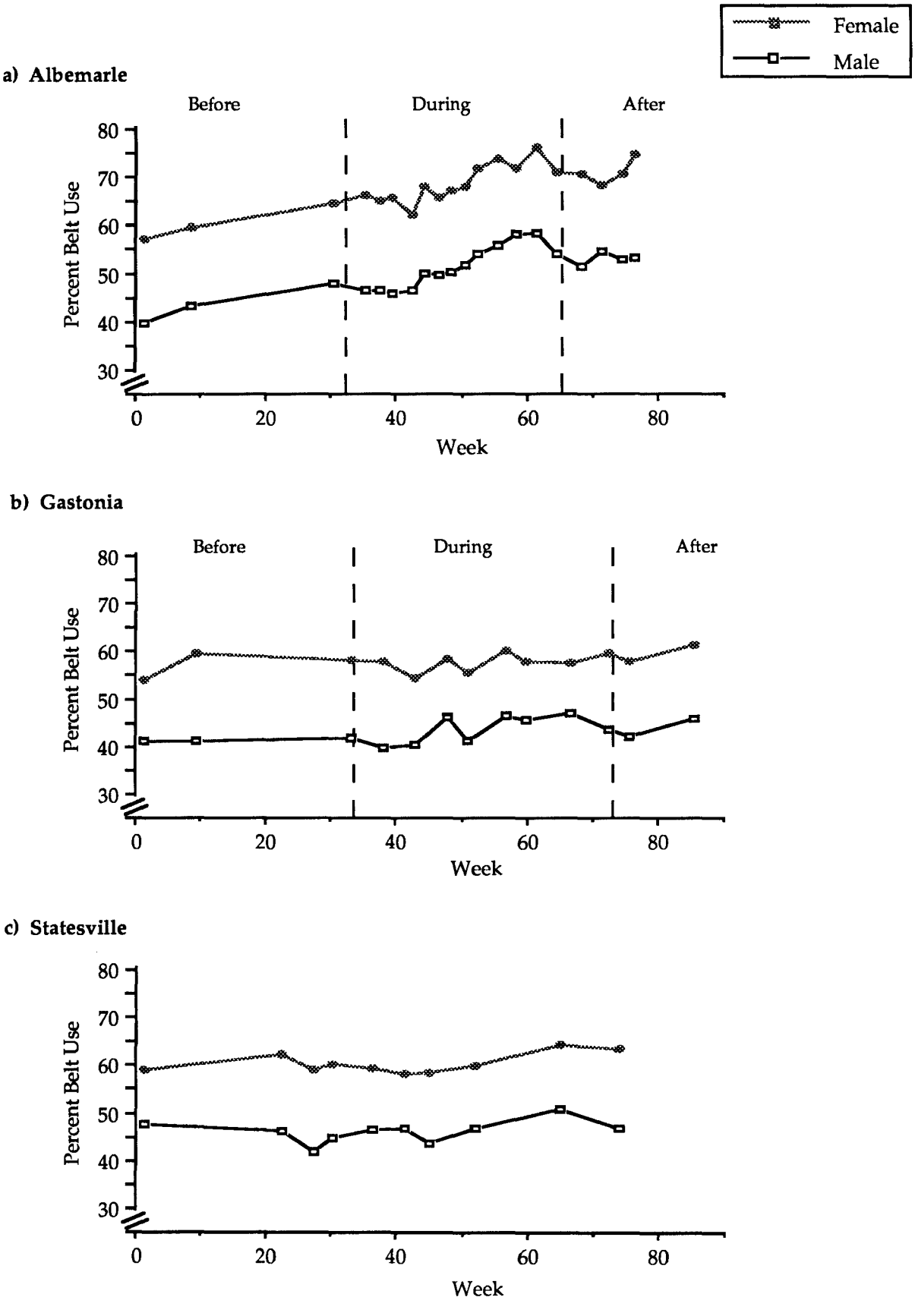


Figure 3.4. Belt use by sex of driver.

driver belt use reached 47 percent on two occasions (with 46 percent for the last data point).

In Statesville, the comparison community, there was a bit more fluctuation in the male driver use rate, which peaked at 51 percent near the end of the data collection (Week 65, Figure 3.4c). The peak value of 64 percent for female drivers also occurred during Week 65.

Belt Use by Race of Driver. The changes in driver belt use by race tended to mirror the changes in belt use by driver sex in Albemarle (Figure 3.5a). The fluctuations were larger for the non-white group, most likely related to smaller numbers of observations. The peak belt use rate for both groups was 68 percent and occurred just prior to the end of the formal program (Week 61). The final data point yielded rates of 65 and 58 percent for white and non-white drivers, respectively.

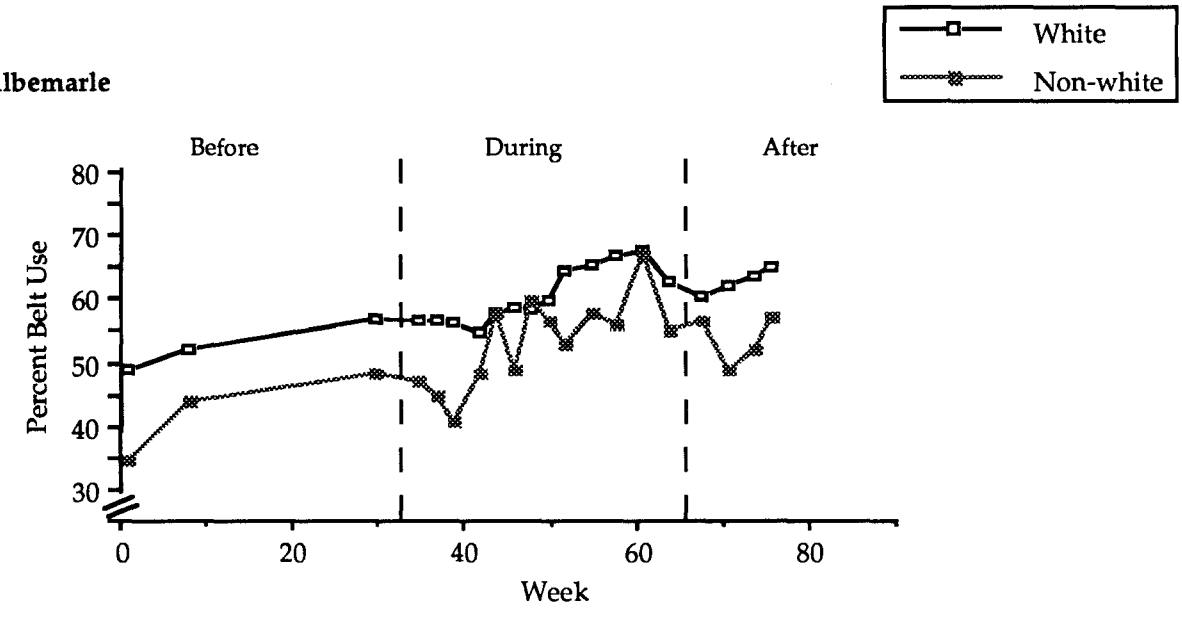
The belt use rates for white and non-white drivers also tended to move in concert in Gastonia (Figure 3.5b). The peak value was 54 percent for whites (occurring at the last data point) and 50 percent for non-whites (occurring twice during the middle of the formal program -- Weeks 57 and 60). Both groups tended to show an increase in belt use across time, but the trend was much stronger for the white drivers.

The plots by race in Statesville (Figure 3.5c) were both relatively flat, with some increase toward the end of data collection. Peak values were 60 percent for white drivers (Week 65) and 48 percent for non-white drivers (Week 22).

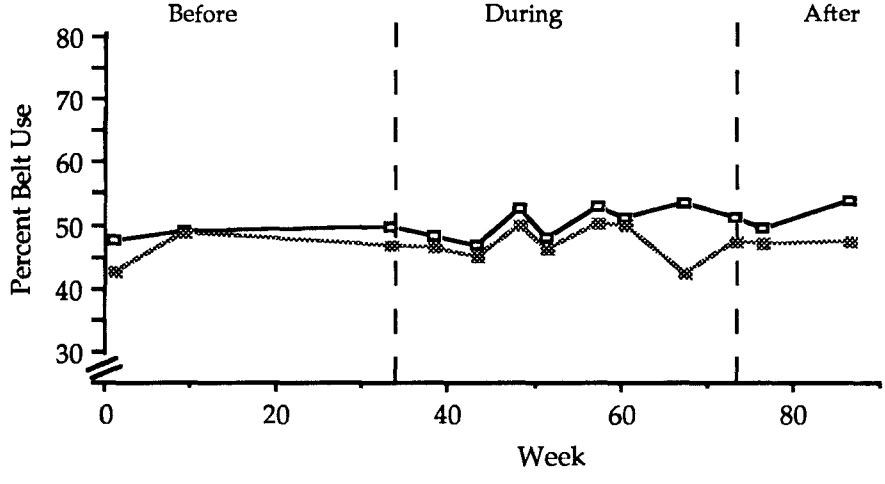
Belt Use by Race and Sex of Driver. In Albemarle, all four race-sex groups showed an increase in belt use during the program, with only slight fall-off thereafter (Figure 3.6a). The groups tended to cluster by driver sex. That is, the white females consistently showed the highest belt use rate, but the non-white females were relatively close behind. The peak values for white and non-white females were 76 and 75 percent, respectively, and occurred near the end of the formal program (Week 61). The male plots were similar but at a distinctly lower belt use level. Peak values were 59 percent for white males (Weeks 58 and 61) and 56 percent for non-white males (Week 61).

The same overall race-sex pattern was evident in the Gastonia data (Figure 3.6b) except that the belt use increases were slight. Peak values were 62 percent for white females (Week 86), 60 percent for non-white females (Week

a) **Albemarle**



b) **Gastonia**



c) **Statesville**

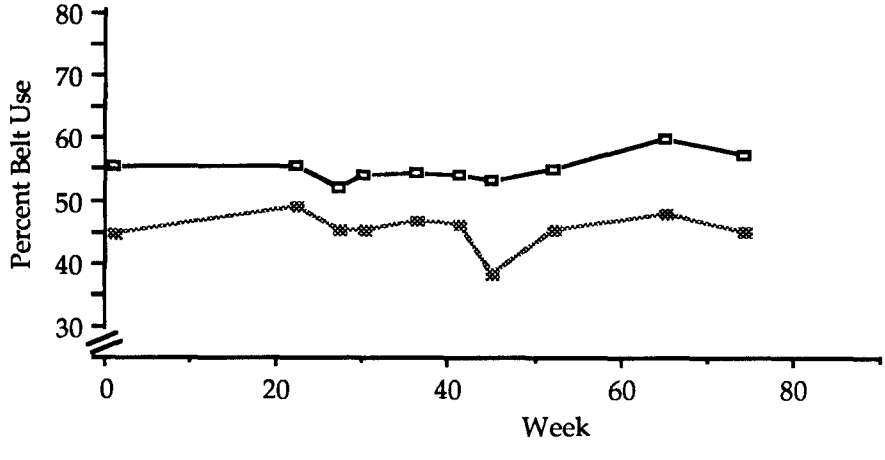


Figure 3.5. Belt use by race of driver.

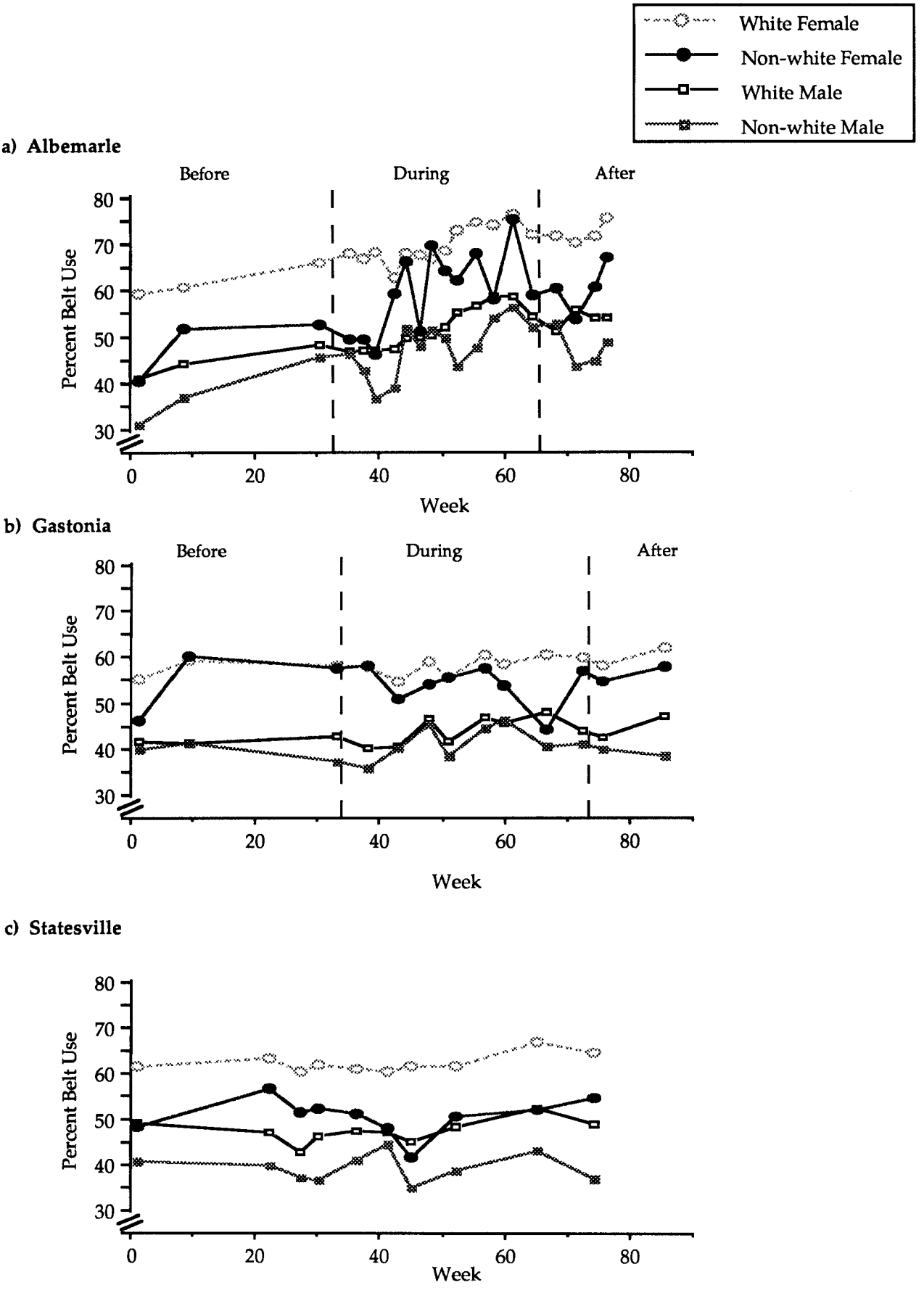


Figure 3.6. Belt use by sex and race of driver.

9), 48 percent for white males (Week 67), and 46 percent for non-white males (Week 60).

The comparison site of Statesville showed the same pattern as Gastonia (Figure 3.6c). Peak values here were 67 percent for white females (Week 65), 57 percent for non-white females (Week 22), 52 percent for white males (Week 65), and 44 percent for non-white males (Week 41).

Modeling

In order to assess the statistical significance of the data displayed in Figures 3.2 - 3.6, the data were combined within each project period to represent aggregate seat belt use rates for the baseline period prior to the initiation of any special seat belt programs, for the program period during which the programs were carried out, and for the follow-up period after the special programs had been completed. For purposes of comparison, the data for Statesville were also partitioned into these same three time periods, even though no program was in effect. Categorical data models were then fit to the resulting seat belt use rates using SAS PROC CATMOD. Three models were developed. In the simplest model, the data were partitioned only by location (city) and time period. For the other two models, the data were further partitioned by (1) vehicle type (cars or trucks), and (2) driver race and sex.

The model for city by time period for all vehicles was fit to the seat belt use rates shown in Table 3.2. Initially, a model which fit the data

Table 3.2. Seat belt use rates by city and time period.

City	Baseline	Program	Follow-Up
Albemarle	.515	.600	.622
Gastonia	.485	.498	.509
Statesville	.538	.521	.567

exactly (i.e., a saturated model) was fit to the above data using a design matrix which characterized the rates from each city in terms of a baseline rate, a change from the baseline rate during the program period, and a further change in the follow-up period. The design matrix was then reduced by omitting non-significant parameters and/or combining baseline rates or period-to-period

changes which did not differ significantly. For the data of Table 3.2, only one such reduction could be made. The changes from program to follow-up period in Albemarle and Gastonia did not differ significantly ($p = .523$), and thus, these effects were combined.

Results from this final model containing eight parameters are shown in Figure 3.7. This model fits the data well (residual $X^2 = 1.97$, $df = 1$, $p = .165$). The three baseline levels shown in Figure 3.7 differ significantly as do all of the remaining period-to-period change parameters ($p < .05$). In this figure as well as in the following two figures, solid lines joining program phases indicate a significant <u>increase</u> in usage rates, dotted lines imply <u>no change</u>, and dashed lines mean that there was a significant <u>decrease</u> in usage rates (see, for example, the decrease in Statesville from the baseline period to the time when programs were in place in Albemarle and Gastonia, as well as the significant increases in belt use from before to during and to after the programs in both Albemarle and Gastonia). Differences in change parameters can be seen from the figure as differences in the slopes of the line segments joining two levels. The outstanding feature of Figure 3.7 is the large increase (steep slope) for Albemarle from baseline to program period reflecting the considerable success of Albemarle's program. The relatively large increase from program period to follow-up period in Statesville is likely due to the large increase in seat belt enforcement.

Figure 3.8 shows the final model (based on eight parameters with residual $X^2 = 11.86$, $df = 10$, $p = .294$) fit to the seat belt data after it was further partitioned by vehicle type (passenger cars versus pick-up trucks, vans, and utility vehicles). Figure 3.8 is seen to be, essentially, two replicas of Figure 3.7; the upper one for passenger cars, and the lower one for pick-up trucks, vans, and utility vehicles. The notable features of Figure 3.8 are, again, the large and significant increase in rates for Albemarle from baseline to program period, and the fact that seat belt use rates for passenger cars differed by a constant amount from that for pickup trucks, vans, and utility vehicles, across the board. In particular, the use rates were 16.3 percentage points higher for passenger cars than for pickup trucks, vans and utility vehicles.

Figure 3.9 shows the results of the final model (based on 13 parameters with residual $X^2 = 11.2$, $df = 22$, $p = .971$) fit to the data broken down by city, time period, race, and sex. Among the notable features of this model is

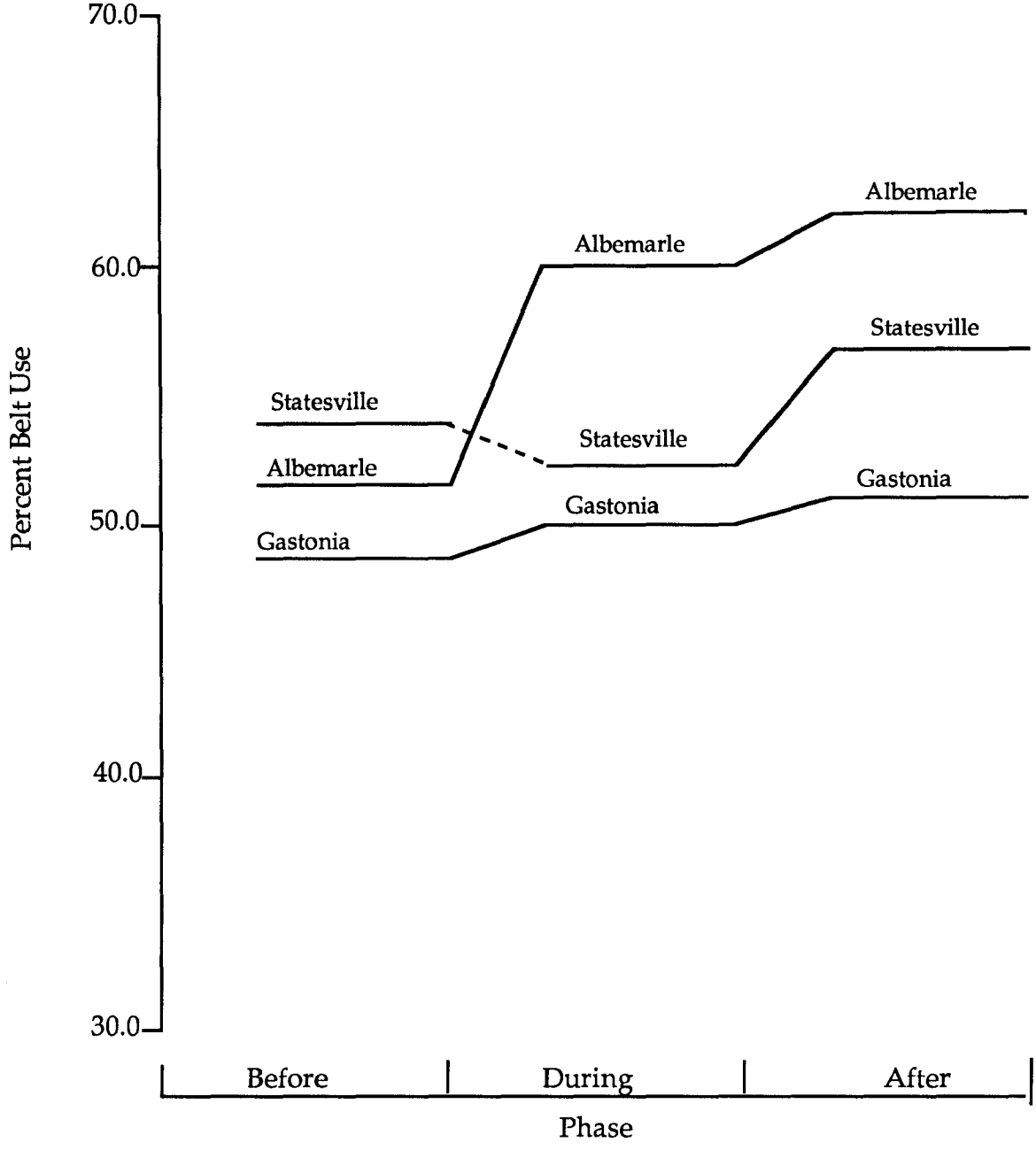


Figure 3.7. Modeled results of seatbelt use by city and time period.

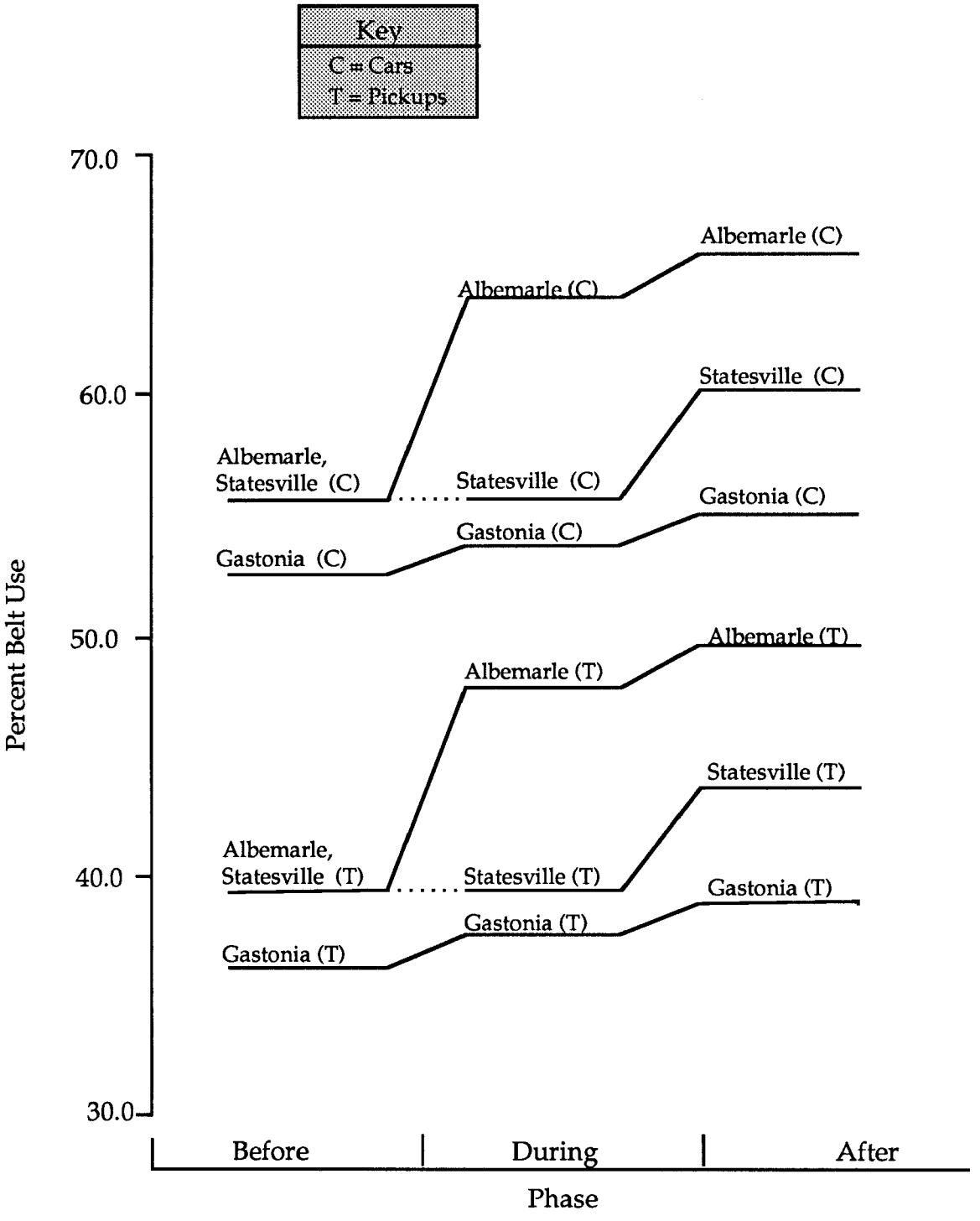


Figure 3.8. Modeled results of seatbelt use by city, vehicle type and time period.

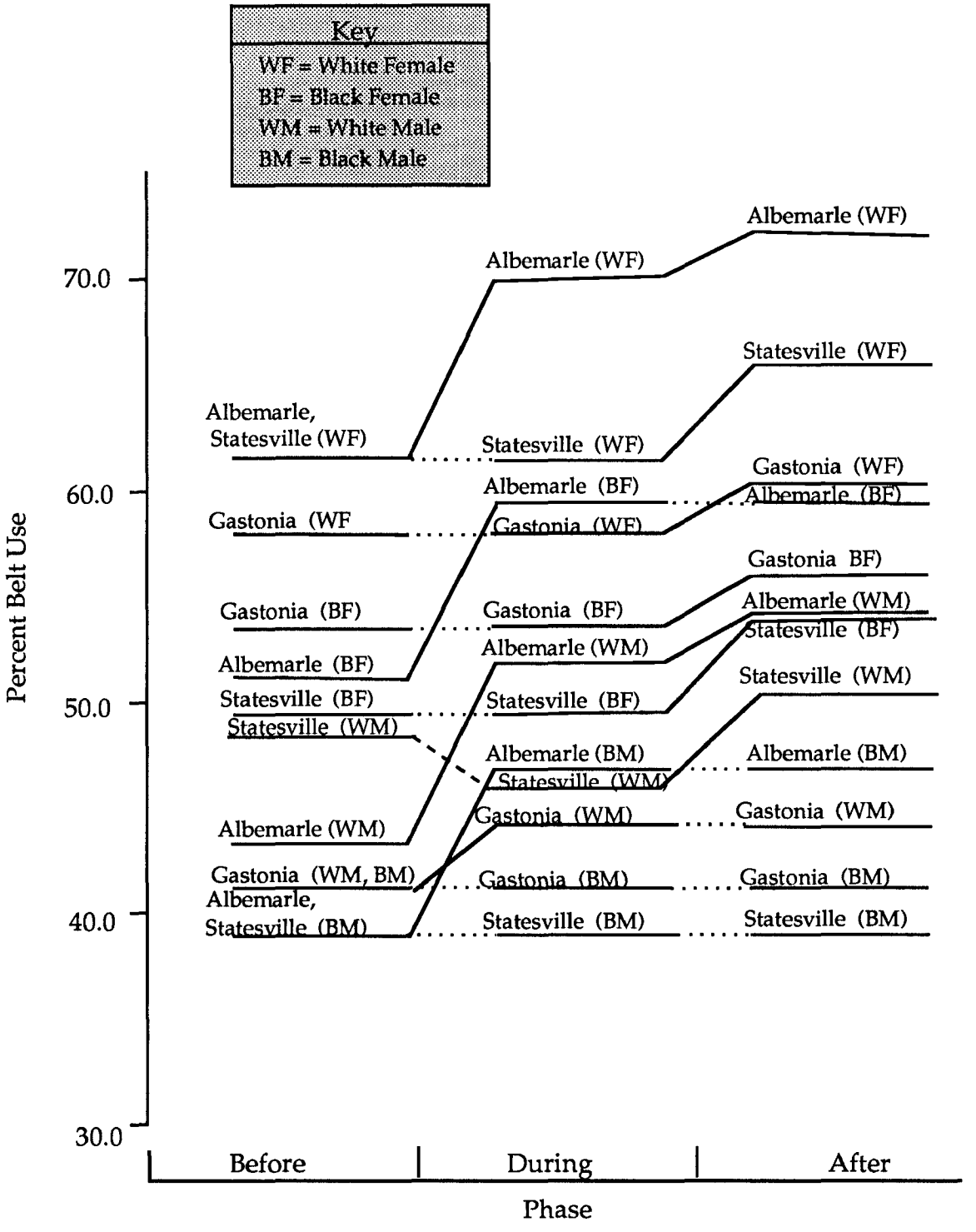


Figure 3.9. Modeled results of seatbelt use by city, race, sex, and time period.

the fact that the increase in belt use in Albemarle from baseline to the program period is the same for all race/sex groups (as noted by the constant slopes). It is also interesting to note that similar increases in the follow-up period in Statesville occur for white males and both white and non-white females, while non-white males exhibit no such increase.

Overall these statistical models are able to detect significant positive results for the non-sanction programs, especially in Albemarle but also in Gastonia. The significant increase in usage rates for Statesville, the comparison site, in the after period most evidently reflects the change in their enforcement policy at that point in time.

Statewide Belt Use Comparison

Statewide belt use data have been collected using a probability sample of 72 observation sites across North Carolina since just prior to implementation of the mandatory Seat Belt Law (October 1, 1985). As shown earlier in Figure 1.1, the overall statewide driver belt use rate has hovered around 60 percent since the middle of 1987. These data include lap belt use, as observers are stationed at stop sign or traffic signal locations where the lap belt data can be obtained.

From June 1989 to January 1990, the overall statewide driver belt use rate decreased a few percentage points, from 61 to 58 percent. The overall statewide rate then rose slightly to 61 percent in September 1990 while the experimental programs were in place. It is felt that these changes reflect typical sampling fluctuations and are unrelated to the changes occurring at the experimental sites. Given the statewide stability, along with the stability of the comparison site data until the extreme increase in seat belt citations, the belt use increases seen at the experimental sites are felt to be attributable to the special non-sanction programs.

Accident Data

Accident data were examined for the two experimental communities and the comparison location to check for any changes in variables that could have been related to the special enforcement programs. Data were accumulated for three years prior to the experimental site kickoffs and for approximately eight months after the kickoffs. Examination of a host of accident variables, including driver injury severity, showed little change across time, a finding

that was not surprising given the small numbers of accidents in these communities and the relatively small changes in belt use. However, due to normal state processing delays, accident data were unavailable for the parts of the project where belt use was greatest. As mentioned previously, the main dependent variable where change was expected was driver shoulder belt use rate.

Summary

From a practical standpoint, the results of the non-sanction seat belt enforcement program show a dramatic increase in belt use in one site and a marginal increase in the second site when compared to a third site where no program was initiated. The gains in belt use seen in both experimental communities were "across the board" with respect to driver sex, race, and vehicle type.

The community of Albemarle (population 16,000) increased their belt use over ten percentage points when the overall before and after belt use rates are compared. Gastonia's (population 60,000) overall belt use increased approximately three percentage points during the comparable period. During the height of the programs, the Albemarle belt use peaked at 68 percent, in excess of the statewide average of about 60 percent, while the Gastonia peak belt use reached 53 percent.

CHAPTER 4. DISCUSSION

General Program Comments

The primary objective of this project was to determine if a program of non-sanction seat belt law enforcement could effectively increase the community belt use rate in a state with a primary enforcement belt law and a high (for the United States) statewide belt use rate. The results clearly suggest an affirmative reply, although there was a large difference in the magnitude of the belt use increase for the two experimental programs. Some of the factors that likely account for these difference are described below.

HSRC has been involved with evaluating programs designed to increase belt use for almost a decade. This current project further reinforces some outcomes seen in earlier projects. First, belt use programs tied to the use of PI&E and some amount of economic incentives regularly succeed if there is **dedicated effort** by program organizers and other staff and volunteers. Even with strong dedication and considerable project activity, however, belt use increases typically take some time to emerge, as if some amount of critical mass results from continued exposure to the program. In this regard, the highly successful Albemarle effort in the current project matches well the path that the award-winning "Seat Belts Pay-Off" community project followed in Chapel Hill, North Carolina back in 1983. In other words, after a period of relatively little belt use change, both programs followed with solid and sustained growth that lasted well after the end of the program.

Secondly, the probability of success for projects like these is directly associated with **size of community**. "Getting the word out" is vital and is simply more effectively accomplished in smaller communities of around 30,000 population or less. Much more mass media impact is necessary once the community population exceeds 50,000. The program can succeed in the larger environment, but the chance for success is improved if the community lies in a self-contained media market where competition for exposure is low.

Thirdly, the use of **economic incentives** is an important ingredient. Although use of incentives played a minor role in this "soft enforcement" project, it is unlikely that the concept would have been as successful using merely "seat belt salutes" and PI&E. A hard-hitting seat belt citation

approach like the earlier-referenced Elmira, New York project can obviously succeed without incentives (and indeed had no place for incentives).

Finally, it is of prime importance that the local police chief and department have a **strong commitment** to wearing seat belts and enforcing the belt law. Lacking this commitment would severely dilute a project effort and obviate a decent chance of success, even with all of the above mentioned factors in place.

Experimental Community Differences

The difference in the degree of success of the two experimental program sites is not extremely surprising. The Albemarle effort had a greater chance of success from the beginning due to its relatively small population and a supportive local newspaper widely read by many in the entire county. The coverage given to "Albemarle Clicks" by the Stanley News and Press was outstanding (See Appendix A for selected examples). In addition, the local radio station provided excellent coverage. The project also received some exposure from Charlotte television stations, but this was considered to be less important for this community than the newspaper effort.

The Albemarle success was also related to other factors, such as the known commitment of the police chief and the local police department to the importance of belts and making sure that all officers wear their belts. Failure to do so was backed by a strong disciplinary policy. In follow-up interviews after the main program was completed, the police chief was called the "backbone" of the project by one shift captain because of the importance he gave to the effort and his belief that officers should be proper role models. The police chief used the press conference that kicked off the program to set an example of the leadership and enthusiasm that was a constant in the program. The Albemarle police officers made the "seat belt salute" a visible part of the project. The chief also allowed the department project coordinator to visit many county locations outside of the community to make seat belt presentations and promote the project. The coordinator was adept at listening to HSRC ideas and tailoring them to his community. Finally, the job of the data collectors cannot be overlooked. These senior citizens promoted the program and gave it much visibility through their continued presence throughout the life of the project.

The overall situation was appreciably different in Gastonia, a community almost four times as large as Albemarle and located only some 20 miles to the west of the metropolitan Charlotte area. It was conceded that "getting the word out" would be considerably more difficult than in Albemarle, but the police department had prior experience in working with the local media in a DWI campaign. In addition, it seemed that this location could take advantage of its proximity to Charlotte by using the enormously popular Charlotte Hornets NBA basketball team as part of the project promotion. These efforts with the Hornets were only partially successful, with some game tickets and autographed basketballs available as prizes for drawings, but none of the anticipated use of players and the popular Hornet mascot at any promotions ever materialized. The inability to find suitable data collectors was also a drawback, in that their continued presence gives much visibility to a project like this.

The other main differences between the two experimental programs related to how community size affects police department activities. Follow-up interviews clearly suggested that, in essence, implementation of a non-sanction belt promotion program appeared to hold less importance for the larger community police officers. Thus, "seat belt salutes," a highly visible activity in the smaller community, were rarely used by the Gastonia officers. It also appeared to be more difficult to merge seat belt checks and other such activities into regular shift duties in the larger Gastonia. The net result was less program exposure. Finally, even though a mandatory belt use policy is in existence for police and other city employees, the Gastonia officers were not careful to always wear their belts, perhaps the result of a disciplinary policy less strict than in Albemarle. For whatever reasons, the HSRC data collectors invariably noted some police officers not wearing belts on any given data collection period. Overall, it may be that the task of keeping officers informed and motivated to support the program is inherently more difficult when dealing with larger departments that have more specialization and separation of duties.

Given the obstacles in reaching the larger and less contained population in Gastonia, the coordinator and his assistant tailored some effective promotions for the community, such as the large-scale shopping mall events, the lifeguard program activity with the two local high schools, and the drive-up window prize activity at banks. Use of an insert in a monthly utility bill sent to all county residents was another smart strategy. With more overall

exposure and increased activity by police officers, it is felt that the Gastonia belt use would also have exceeded the statewide average.

It is clear that both programs benefitted from the funds provided by the North Carolina Governor's Highway Safety Program. The availability of some kind of supplemental funding should be considered by any police agency undertaking a similar effort. Sufficient funds can possibly be raised locally, but this appears to be an uncomfortable task for local police. Perhaps a community coalition could perform the fund raising as an alternative.

Conclusion

The approach of using a non-sanction seat belt law enforcement program to increase belt use in a community can be an effective intervention, even in a state with a primary enforcement law and a relatively high belt use rate. This demonstration project showed, not surprisingly, that community size is an important factor and that promoting the concept is more easily accomplished in a smaller setting. Nevertheless, it is felt that the approach can also succeed in larger communities (greater than 50,000 population) given adequate exposure.

In the current setting of belt laws in existence in about 80 percent of the states in the United States, seat belt law enforcement is most likely the key factor in increasing overall belt use rates. It is vital that law enforcement agency personnel serve as good role models by wearing their belts, and that they understand the importance of seat belt citations. Besides citations, this project has shown that non-sanction forms of seat belt promotion by law enforcement agencies can also be effective in increasing use rates.

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APPENDIX A

Example Program Materials

Albemarle Program
Brochure
Front and Back Sides

IF YOU OR SOMEONE YOU CARE ABOUT USES ANY OF THESE EXCUSES TO NOT BUCKLE UP, PLEASE TAKE A FEW MOMENTS TO READ THE FACTS.

> "It will never happen to me." Or "I'm a good driver. I won't be going very far and I won't be going fast."

Some people think they are in complete control of what happens to them. Over 100,000 "good" drivers are struck by "bad" drivers each year in NC. Most of these crashes happen close to home, where we do most of our driving, and even slow speeds can be deadly. Don't forget, you can't control the speed of the car that runs into you.

One out of every three of us will be in a serious crash sometime during our lives.

Each year 1 out of 15 NC drivers is involved in an accident. These crashes result in 1 person injured every 4 minutes and 1 person killed every 6 hours.

> "Whether or not I wear my seat belt is my business. No one has the right to tell me I have to buckle up."

Driving is a privilege. We don't have the right to drink and drive, go any speed we want or run stop signs, and NC law also says that we must use seat belts. Why? Because not buckling up affects many people. Police officers see the pain family and friends suffer when they are told someone they love was injured or killed in an accident. Disabling injuries can cause lifelong dependency on loved ones. And everyone's insurance rates and tax funds are affected by huge medical costs and loss of income.

> "I'd rather be thrown clear in a crash," or "I might be trapped in a burning car."

A person is 4 times more likely to die if thrown from the car. Being thrown out means hitting the pavement, a tree, another car or even having your car roll on top of you. Television and movies like to portray crashes as fiery plunges off cliffs. In reality, only about 1 out of every 2,500 crashes involves fire.

> "My seat belt doesn't work. I can lean all the way to the dashboard."

Modern belts do let you move more freely and comfortably during normal driving but will lock up in a sudden stop or crash. Check your owner's manual or call your car dealer if you are unsure.

> "Belts can hurt you in a crash. I've heard of someone who died in a seat belt."

If a crash is severe enough for the belt to cause injuries, the crash forces probably were powerful enough to do even more severe harm to an unbelted person.

True, belts cannot save everyone. As more people buckle up, more people will die buckled up. If someday we reach the point where everyone who dies in crashes is buckled up, then we will know that we are saving everyone who could be saved by the use of a seat belt. When a belt is not used, we have no way of knowing if that had been a survivable crash.

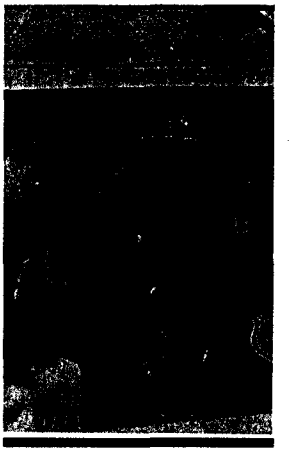
Brochure for
Albemarle Program
Inside Section

Wearing a seat belt is the most important thing you can do to protect yourself in a crash.

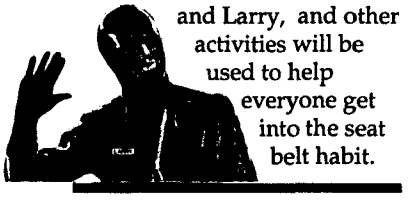
The Albemarle Police Department wants everyone to get into the seat belt habit and to have some fun doing it.

A "THUMB'S UP" APPROACH TO BELT USE

Police officers will be reminding people of the importance of belts by tugging on their own belts. They'll be giving the "thumb's up" sign to remind unbelted motorists to buckle up or as a sign of appreciation for those who are buckled up.



Banners, contests, visits from the crash-test dummies Vince and Larry, and other activities will be used to help everyone get into the seat belt habit.



WIN PRIZES

From time to time, motorists will be stopped and given prizes for wearing their seat belts. There will be big prizes and small prizes and many chances to win. The only requirement is that you be wearing your seat belt.

Join in the fun by tugging on your belt and giving the "thumbs up" too.

WHY A SEAT BELT PROGRAM?

The members of the Albemarle Police Department are enthusiastic about this seat belt campaign. We know first hand the value of belts. We see the senseless deaths and injuries caused by crashes, and we see adults and children coming out of serious crashes with little or no injuries because they were belted.

Seat belt use in Albemarle and Stanly County needs to be higher.

Albemarle Clicks is a fun way to increase seat belt use in this area. We will give "thumbs up" reminders to people we see who are unbelted, and many folks will win prizes for being buckled up. We're also going to be monitoring seat belt use and keeping you informed as to how well we're doing.

We care about your safety. If friendly reminders don't get the message across that we're serious about belts, then we will not be shy about writing seat belt citations - but we'd be happier if we could take the fun approach.

So buckle up, and let's make Albemarle Click!

Charles B. McManus
Chief of Police

Albemarle Clicks!

Buckle Up and Survive the Drive.

For more information, contact the Albemarle Police Department, 203 North Second Street, Albemarle, NC 28001 (704) 982-1131

The people of Gastonia are THE BEST !
And wearing a seat belt is the best thing you can do to protect yourself in a crash.

The Gastonia Police Department wants everyone to get into the seat belt habit and have some fun doing it !

A "THUMB'S UP" APPROACH TO BELT USE

"Protect the Best - Gastonia Buckles Up !" is a community program being conducted by the Gastonia Police Department to get the people of Gastonia to buckle up and to let them know that we think they are the best.

Officers will be tugging on their own belts and giving the "thumb's up" sign to remind motorists to buckle up or as a sign of appreciation to those already buckled up. Banners, contests and other activities will be used to help everyone get into the seat belt habit.

Brochure for Gastonia Program Inside Section

WIN PRIZES

From time to time, motorists will be stopped and given prizes for wearing their seat belts. There will be big prizes and small prizes and many chances to win. The only requirement is that you be wearing your seat belt.

Join in the fun by tugging on your belt and giving the "thumbs up" too.

PROTECT THE BEST
Gastonia Buckles Up !

WHY A SEAT BELT PROGRAM?

The members of the Gastonia Police Department are enthusiastic about this seat belt campaign. We know first hand the value of belts. We see the senseless deaths and injuries caused by crashes and we see adults and children coming out of serious crashes with little or no injuries because they were belted.

Seat belt use in Gastonia and Gaston County needs to be higher.

"Protect The Best" is a fun way to increase seat belt use in this area. We will give "thumbs up" reminders to people we see who are unbelted, and many folks will win prizes for being buckled up. We're also going to be monitoring seat belt use and keeping you informed as to how well we're doing.

We care about your safety. If friendly reminders don't get the message across that we're serious about belts, then we won't be shy about writing seat belt citations - but we'd be happier if we could take the fun approach .

So buckle up, and protect THE BEST !

Jack S. Postell
Chief of Police

"Protect The Best" is a joint program of the Gastonia Police Department, the North Carolina Governor's Highway Safety Program and the UNC Highway Safety Research Center. For more information, contact the Gastonia Police Department, Gastonia, NC 28053 (704) 866-6936

Program-Related Article
Appearing in
The Stanly News & Press

S & Press

13, 1989 35¢ PER COPY 24 PAGES

Photo by DAVID DEESE

Officer Lynn Howell of Albemarle Police Department gives signal
...tug on seat belt and thumbs up sign remind drivers it's important to buckle up

Albemarle clicks...
It's time to buckle up

By JO ANNE B. EFIRD
SNAP Lifestyle Editor

Beginning Wednesday, Albemarle motorists should give closer attention to fastening their seat belts.

Using the theme "Albemarle Clicks — Buckle Up and Survive the Drive, the Albemarle Police Department will kick off a program at 9 a.m. at Albemarle High School Auditorium to get more motorists to buckle up.

Race car driver and seat belt supporter Kyle Petty, seat belt dummies Vince and Larry, and Mcgruff, the crimefighting dog, will be on hand to help the program department get the program started at 9:30 a.m.

Although North Carolina has a seat belt law, officials say only about 50 percent of motorists use them.

continued on page 11A

Auotmatic
Safety Belt Flier
Placed on Cars
in Parking Lots

Congratulations !

You have a car especially designed to protect you, with automatic seat belts or an air bag. But in order to take advantage of this automatic protection, there are still a few things you need to do yourself.

If you have automatic belts . . .

With many automatic belt systems, the shoulder belt moves when the door is shut, to fit around the driver and front seat passenger. If your belts work like this, be sure that you still buckle your lap belt. The shoulder belt alone will not give as much protection as when used together with a lap belt.

still use your lap belts.

If your car has an air bag . . .

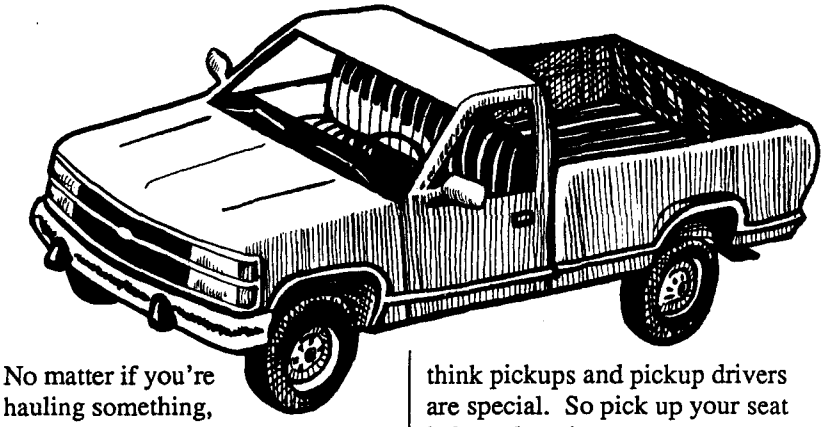
Even in cars that have air bags, it's still important that seat belts be used. Air bags work well in head-on crashes. In all other types of collisions -- rear, side, and roll over, seats belts are needed to hold you in place and keep you safe. Used together, air bags and seat belts give you the best protection you can get.

keep buckling up.

This safety message was placed on your car by the Stanly County Explorer Post 104, and the Albemarle Police Department, as part of a community seat belt program sponsored by the Albemarle Police.

P.S. **If we goofed, and you don't have automatic seat belts or an air bag, please forgive our error. But we still encourage you to be safe. Make sure everyone in your car is buckled up.**

Gastonia Is A Pickup Town



People in Gastonia really love their pickups. That's great, but here's something to think about before you head down the road.

Pickups have never been required to offer as many safety features as cars. Even though pickups are generally safe vehicles, they don't give as much protection as cars in crashes. This makes it especially important that you and your passengers use your seat belts.

No matter if you're hauling something, going to work, driving on the job, just riding around town, or out 4-wheeling, you should always wear your seat belt. Your belt will hold you in place, keeping you from hitting some part of your truck's interior, or even being thrown from it, if you are in a wreck.

The Gastonia Explorer Post 515 and the Gastonia Police Department think pickups and pickup drivers are special. So pick up your seat belt, and get it on.

This safety message was placed on your truck by the Gastonia Explorer Post 515 and the Gastonia Police Department as part of a community seat belt program. Protect the Best - Gastonia Buckles Up.

Buckle Up Flier Placed on Pickup Trucks

PROTECT THE BEST

Gastonia Buckles Up !

The people of Gastonia are THE BEST, and wearing a seat belt is the best thing you can do to protect yourself in a crash. **"Protect the Best - Gastonia Buckles Up!"** is a community program of the Gastonia Police Department. We want everyone to get into the belt habit and have some fun doing it.

Officers will be tugging on their own belts and giving the "thumb's up" sign to remind you to buckle up, or to say thanks for already buckling up. City banners, contests, police programs and other activities will be used to help everyone get into the seat belt habit.

BIG PRIZES, SMALL PRIZES, MANY CHANCES TO WIN

From time to time, motorists will be stopped and given prizes by police officers, or by Vince and Larry, the TV crash dummies. The only requirement to win is that you be wearing your seat belt. Buckle up and join in the fun.

Tug on your belt, and give the "thumb's up" too. Let's protect the **Best** - buckle up Gastonia!

For more information about the seat belt program, **Protect the Best**, contact the Gastonia Police Department, (704) 866-6936.

POLICE
CITY OF GASTONIA
NORTH CAROLINA

Utility Bill Insert

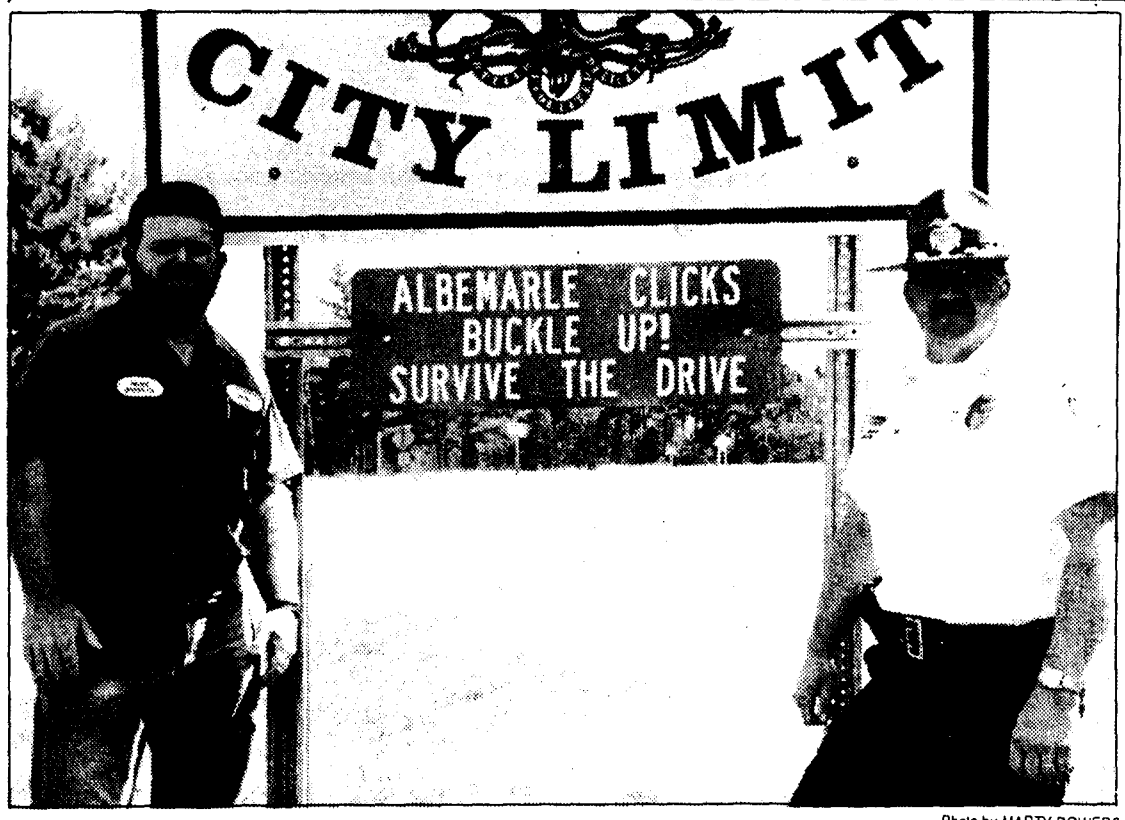


Photo by MARTY BOWERS

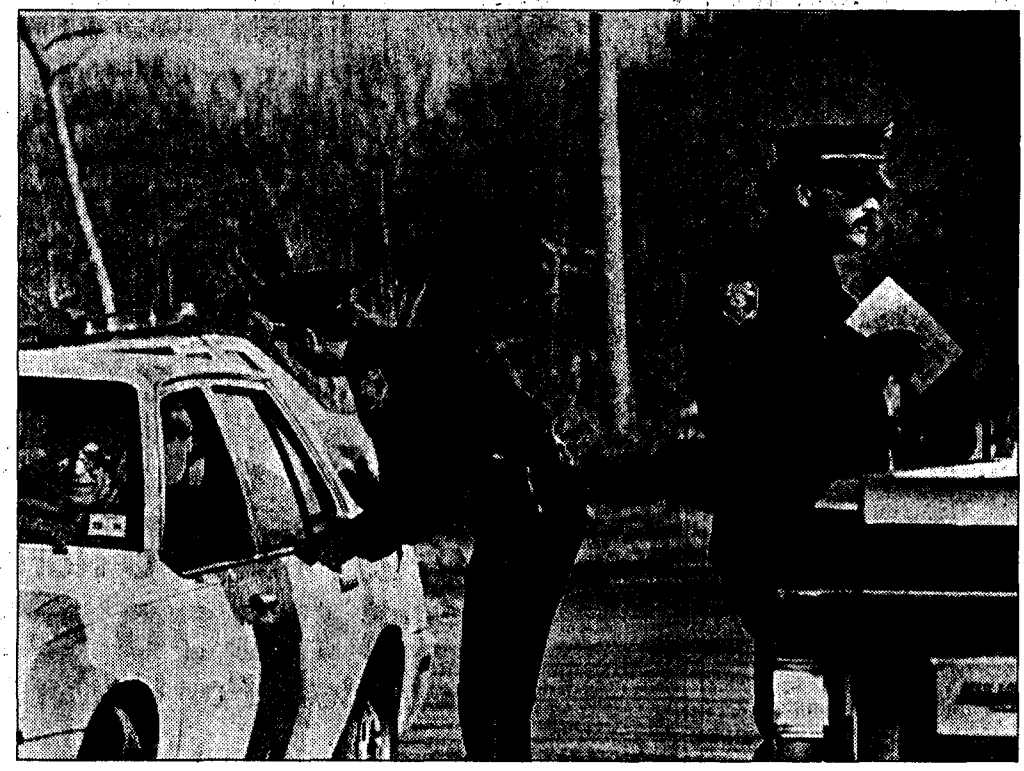
Signs of a successful campaign

Signs promoting the Albemarle Police Department's seat belt campaign, Albemarle Clicks, Buckle Up and Survive the Drive are being put up at all entrances to the city. The signs were made and are being put up by the City of Albemarle street department. This is another phase of the drive, which began in November. Mike Poplin (L) of the city street department and Capt. Matt Cagle of the Albemarle Police Department are at the sign on the N.C. Highway 24-27 bypass west of Albemarle. Cagle said, "We are proud of the citizens of Albemarle who have done so well in this campaign." Sixty-five percent of Albemarle citizens now use seat belts, up 15 percent since the campaign began.

Program-Related Photo and Brief Article Appearing in The Stanly News & Press

A Traffic Stop You Won't Mind

Gastonia police Officers Steve Colvard (left) and Jeff Ford stop cars along North Modena Street on Tuesday to hand out brochures and key rings promoting seat-belt use. Gastonia police will conduct periodic seat-belt checks over the next six months as part of their "Protect the Best" safety campaign.



CURTIS PARKER/Staff

Program-Related Photo and Brief Article Appearing in the Gaston Observer

PROTECT THE BEST

Gastonia Buckles Up!

The Gastonia Police Department

Bumper Sticker

APPENDIX B

Computation of Community Seat Belt Use Rates

APPENDIX B. COMPUTATION OF COMMUNITY SEAT BELT USE RATES

Communitywide seat belt use rates for a given point in time are estimated from observations made at a representative sample of roadway locations in the community. The method used for combining these observations is discussed in this appendix.

To illustrate the problem and the approach taken, consider first a simple situation where observations are taken at only two locations: A and B. To further simplify, suppose we are only interested in seat belt use (i.e., we do not record information concerning race, sex, and vehicle type). In addition, suppose location A has traffic volume low enough that our data collectors can observe each vehicle passing point A in a 30 minute time period, and record the driver's belt use status. The data collected from location A can be summarized by the two numbers,

N_{A1} = the number of belted drivers, and

N_{A2} = the number of drivers not belted

Then $N_A = N_{A1} + N_{A2}$ is the total number of observations made at location A in the 30 minute time period.

Suppose at location B, the traffic volume is so high that the observers cannot observe every vehicle, and, instead, are forced to sample the traffic stream. The sampling is carried out by observing the first available vehicle at the start of the observation period, recording the observation, then observing the next available vehicle, etc. Observers are trained to sample in this manner without bias regarding belt status, race, sex, or vehicle type. At locations where sampling is required, it is also necessary to get estimates of the traffic volume. These estimates are obtained from two five-minute traffic counts, the first made just prior to the seat belt observation period, and the second taken immediately following the end of the observation period. Note that these traffic counts are simple tabulations of the total number of eligible vehicles -- no breakdown by race, sex, or vehicle type.

For location B, then, suppose we have the two volume counts along with seat belt observations for a time period of 30 minutes. These data are summarized by the quantities:

V_{B1} = 1st 5-minute traffic count,
V_{B2} = 2nd 5-minute traffic count,
N_{B1} = Number of belted drivers observed,
N_{B2} = Number of drivers not belted,
T = Observation period = 30 minutes.

Now, seat belt use rates can be estimated at both locations by

$P_A = \frac{N_{A1}}{N_{A1} + N_{A2}}$ and $P_B = \frac{N_{B1}}{N_{B1} + N_{B2}}$, respectively. To combine these two rates into a single rate representing the overall rate at both locations, we note that P_B is representative of a larger population of drivers than is P_A, and thus, P_B should carry more weight than P_A relative to the overall rate. In particular, to be representative of the total traffic in the community, the weights should be chosen to be proportional to the traffic volumes. At location A, the (30 minute) traffic volume is simply the total number of observations N_A. At location B, the 30-minute traffic volume is estimated by $V_B = 3(V_{B1} + V_{B2}) = 6 \frac{V_{B1} + V_{B2}}{2}$ = 6 (average 5 minute volume count)

At locations like A where sampling is not required, it still may be necessary to estimate traffic volumes if the observation period is not exactly 30 minutes and/or if some observations cannot be classified and are simply counted as unknown. In this case, the traffic volume is estimated by $V_A = (T_A/30)\ (N_A + U_A)$, where T_A is the length of the observation period and U_A is the number of unknowns at location A. The general case (i.e., more than two locations with the data broken down by race, sex, and vehicle type) is presented below in mathematical detail.

For a given city or community, suppose we have J locations indexed by the subscript j = 1, 2, ..., J. From the observations at location j, we have the following data summary statistics:

Five minute traffic counts: C_{1j} and C_{2j},

Length of observation time interval: $T_j = T_{j,end} - T_{j,start}$

Number of unknowns: U_j.

Seat belt observations: N_{jvdb} (see Table B.1) where

j indicates location
v = 1,2 refers to vehicle type
d = 1,2,3,4 refers to race/sex category
b refers to belt status

Table B.1

Veh. Type	Race x Sex	Belt Use: 1-Belted	Belt Use: 2-Not Belted	Total
1-Car	1 - bf	n_{j111}	n_{j112}	$N_{j11\cdot}$
	2 - bm	n_{j121}	n_{j122}	$N_{j12\cdot}$
	3 - wf	n_{j131}	n_{j132}	$N_{j13\cdot}$
	4 - wm	n_{j141}	n_{j142}	$N_{j14\cdot}$
2-Truck, Van	1 - bf	n_{j211}	n_{j212}	$N_{j21\cdot}$
	2 - bm	n_{j221}	n_{j222}	$N_{j22\cdot}$
	3 - wf	n_{j231}	n_{j232}	$N_{j23\cdot}$
	4 - wm	n_{j241}	n_{j242}	$N_{j24\cdot}$
Total				$N_{j\cdots}$

Now let $N_{j\cdots}$ be the total number of observations at site j. That is,

$$N_{j\cdots} = \sum_{v,d,b} N_{jvdb} = \sum_{v,d} N_{jvd\cdot} \quad ,$$

and $N = \sum_{j=1}^{J} N_{j\cdots}$ be the total number of observations in the community.

If no volume counts are taken, i.e., if $C_{1j} + C_{2j} = 0$, then define the factor $Z_j = \frac{30}{T_j} \quad \frac{N_{j\cdots} + U_j}{N_{j\cdots}}$; this factor adjusts for an observation time $\neq$ 30 minutes and also for unknowns, U_j. If volume counts are taken then let $Z_j = \frac{3(C_{1j} + C_{2j})}{N_{j\cdots}}$. Next compute the sum across locations,

$\tilde{N} = \sum_{j=1}^{J} Z_j N_{j\cdots}$ and define weights $W_j = Z_j \frac{N}{\tilde{N}}$.

We now use the weights, W_j, to generate a new set of frequencies to replace those of Table B.1. These frequencies are

$$N^*_{jvdb} = (W_j)(N_{jvdb}) \quad .$$

Summing these frequencies over locations, we obtain

$$N^*_{\cdot vdb} = \sum_{j=1}^{J} N^*_{jvdb} = \sum_{j=1}^{J} (W_j)(N_{jvdb}) \quad ,$$

and these quantities are used to estimate the communitywide belt use rates. Thus, the rate for <u>passenger cars</u> is,

$$P_{\cdot 1\cdot\cdot} = \frac{\sum_{d=1}^{4} N^*_{\cdot 1d1}}{\sum_{d=1}^{4} (N^*_{\cdot 1d1} + N^*_{\cdot 1d2})}$$ summing over race and sex.

The rate for <u>black males</u> is

$$P_{\cdot\cdot 2\cdot} = \frac{\sum_{v=1}^{2} N^*_{\cdot v21}}{\sum_{v=1}^{2} (N^*_{\cdot v21} + N^*_{\cdot v22})}$$ summing over vehicle type.

With this weighting scheme, the overall total of the weighted (or adjusted) frequencies should be equal to the sum of the observed frequencies, namely, $\sum_{jvdb} N^*_{jvdb} = N$. The adjusted frequencies $N^*_{\cdot vdb}$ are the appropriate frequencies to output to CATMOD for further statistical analysis.