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Site Report: Lexington, Kentucky Field Test of Combined Speed, Alcohol, and Safety Belt Enforcement Strategies

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Ted Anderson served as COTR on the project.

16. Abstract

This report describes the implementation and evaluation of a traffic safety program in Lexington, Kentucky. The goal of the program was to reduce the incidence of speeding, alcohol-impaired driving (DWI) and non-use of safety belts through well-publicized enforcement strategies focusing attention on all three areas. The Lexington Division of Police selected "Traffic Watch" as the theme for their program. The program sequentially emphasized five different combined enforcement strategies over a period of approximately one year. A public information and education program that focused on each strategy ran for about two months. The study concluded that Lexington's combined enforcement program was effective against both speeding and DWI. The program did not result in a statistically significant increase in safety belt use. However, it was able to maintain the high use rates that Lexington was experiencing prior to the beginning of the combined program.

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The authors are grateful to the many individuals who helped in this project. We would especially like to thank those in state and local government agencies in Kentucky and Tennessee who assisted us.

The actual execution of the test program was performed entirely by the Lexington-Fayette, Kentucky Division of Police (LPD). We are grateful to Assistant Chief Larry Ball of the Department for his enthusiastic support of the combined enforcement experiment and for assigning key members of his staff to work on the project. We are most grateful to those in the local media who contributed their time and resources in support of the public information component of the project. The effort of Ron Mossotti of Hammond Productions in producing and public service announcements about the project is especially appreciated.

Chattanooga was the comparison site for the Lexington project. Its role was to provide data on related traffic enforcement activity in Chattanooga, and to help in the collection of survey data from the driver license stations in Chattanooga. Ms. Peggy Ramage of the Hamilton County Department of Health was our principal point of contact in Chattanooga. We thank all of the them for their help.

The Kentucky Department of Safety (KDS) also played a critical role in the data collection effort associated with this project. The surveys of driver attitudes and behavior were conducted in the Department's driver license stations in Lexington. The Department also provided traffic accident tapes for use in our evaluation of the project.

Mid-America was assisted in this project by two subcontractors, the University of North Carolina Highway Safety Research Center (HSRC) and the Center of Applied Research (CAR). The public relations firm of Chenault, Hemmer & Company (CHC) of Lexington helped Chief Ball develop public information concepts and materials. We extend our thanks to our colleagues at HSRC, CAR, CHC, and Mid-America, who helped in this study. Richard Knoblauch and Marsha Nitzberg of CAR played key roles in collecting field data of vehicle speeds and seatbelt use in Lexington and Chattanooga. Mr. Todd Strecker led the PI&E effort at CHC. Peter V. Murphy of Mid-America assisted in the PI&E effort, and Georgine Russell of Mid-America assisted in producing the report.

We thank all who assisted.

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EXECUTIVE SUMMARY

This report describes the implementation and evaluation of a project in Lexington, Kentucky, to test the hypothesis that combined speed, alcohol, and seatbelt enforcement strategies, coupled with a strong PI&E program, can reduce the incidence of speeding, alcohol-impaired driving, and non-use of seatbelts. This project publicized the enforcement of several highway safety laws *in combination*, rather than enforcement of one particular law. This approach is designed to make enforcement more efficient in raising perceived risk of arrest for each type of violation and also to achieve increased deterrence by creating a perception of more severe penalties for multiple violations occurring in a single incident. We hypothesized that, as a result, deterrence for one category of violation may be enhanced by the perceived severity of sanctions for another.

THE COMBINED ENFORCEMENT PROGRAM

The Lexington program sequentially emphasized five different combined enforcement strategies during a period of approximately one year. A PI&E campaign focussing on each strategy was operated for about two months. A general program theme underlaid all of these campaigns, stressing the concept of simultaneous enforcement of speeding, DWI, and occupant restraint laws. The theme selected by the Lexington Police Department was *Traffic Watch* which is a program within its overall community involvement program called *Safety Watch*.

The logo, which appeared on the inside of the citation jacket represents a roadway and two individuals with the words *Traffic Watch* underneath. This symbol appeared on all materials associated with the program and provided identity with the overall program for each separate PI&E piece.

The lead enforcement strategies of the five campaigns were:

1. *Traffic Watch* Program Introduction.
2. Radar Display with Enforcement Emphasis in School Areas and College DUI Enforcement
3. Saturation Patrol.
4. Child Restraint Enforcement and High Incident Locations.
5. Speeding-Youthful DWI Blitz.

The formal kickoff of the program (Strategy 1) was on July 2, 1991. However, enforcement activity preceded this date by three months, increasing gradually to roughly constant level that was attained at about the time of program kickoff.

THE EVALUATION

The evaluation effort was directed at measuring the effect of the combined enforcement / PI&E program on:

- driver awareness of the program;
- driver perceptions of enforcement;
- driver self-reported behavior with respect to speeding, drinking-driving, and seatbelt use;
- measured speed distributions and seatbelt use at several locations throughout the program period; and
- accidents and accident variables related to drinking-driving, speeding and seatbelt use.

A comparison site (Chattanooga, Tennessee) was used to help recognize trends that could affect the test site and confound the effects of the program in the test site (Lexington, Kentucky). The comparison site was chosen so as to match the test site as closely as possible except that it planned no special traffic-law enforcement program. After the sites had been selected we learned that Chattanooga had been given the opportunity to implement an intensive speed enforcement campaign supported by a PI&E effort. The project was funded by a state grant from the Tennessee Governor's Highway Safety Program matched with local government funds, and was conducted from March 1991 through September 1991.

Through this program, Chattanooga provided data for analyzing whether the combined enforcement approach was more effective than a single-violation approach. However, Chattanooga could not be considered a "control site" for Lexington as originally planned, since Chattanooga had already implemented its speeding campaign when the Lexington program began.

In Lexington, the speed measurement data showed a drop in all measures of speeding in the time extending from the period before the *Traffic Watch* program began to the time when the last set of speed measurements was taken, 12 months after the program began. All of these reductions except one were statistically significant.

In Chattanooga, there was also a statistically significant drop in the change in percentage of vehicles exceeding the speed limit by at least 10 mph shortly after the start of its speeding campaign. This effect was maintained throughout the Chattanooga campaign and continued on beyond the campaign for another nine months when data collection ceased.

The preliminary analysis of accident data in Lexington showed no significant change in police-reported speeding accidents (nor in nighttime accidents, a surrogate for alcohol-related accidents) during the program period.

There was no measurable difference in seatbelt use in Lexington over the period of the *Traffic Watch* program, nor in Chattanooga over the period monitored in our evaluation.

The driver-survey data provided no support for the findings from the speed measurement data that speeding generally decreased in Lexington over the project period. There was no change either in awareness of speeding messages or in self-reported speeding, and perceived enforcement of speeding actually decreased. However, in Chattanooga, the survey data were a little more consistent with the reductions in observed speeding: awareness and self-reported behavior did not change, but perceived enforcement increased very significantly. The survey data provided no evidence of any meaningful change in awareness, perceived enforcement, or self-reported behavior with respect to DWI or seatbelt use in either site over the project period.

CONCLUSIONS

We conclude that Lexington's combined enforcement program was effective against both speeding and DWI. All measures of speeding were decreased, and especially those that were related to lower-speed speeding violations. The percentage of vehicles exceeding the speed limit by at least 5 mph decreased by 14%, and minor injury accidents decreased by 17%. Both of these decreases were statistically significant. Statistically significant reductions in alcohol-related accidents in the 10% range were also observed.

The Lexington program did not result in any decrease in seatbelt usage, but it was able to maintain the high rates Lexington was experiencing when its combined enforcement program began.

There is also evidence that Chattanooga's speeding campaign was effective against speeding. All measures of speeding decreased during the campaign, including the percentage of vehicles exceeding the speed limit by at least 10 mph (8%). Injury accidents decreased significantly also by about 8%. The Chattanooga campaign had no apparent effect on seatbelt usage or DWI.

In some respects, the Lexington combined enforcement program had higher highway safety benefits overall than did Chattanooga's single-violation program, because the Lexington program achieved significant reductions against DWI in addition to speeding and speeding-related accidents.

Thus, this field test shows that a combined-enforcement program can be effective against at least two its target violations, speeding and DWI. The field test suggests that effectiveness against a third violation, non-use of seatbelts, might also be achievable, especially in jurisdictions that have low usage rates prior to the introduction of a combined enforcement program.

1 - INTRODUCTION

GENERAL NATURE OF THE PROJECT

This report describes the implementation and evaluation of a project in Lexington, Kentucky, to test the hypothesis that combined speed, alcohol, and seatbelt enforcement strategies, coupled with a strong public information and education (PI&E) program, can reduce the incidence of speeding, alcohol-impaired driving, and non-use of seatbelts. The project was conducted for the National Highway Traffic Safety Administration under Contract No. DTNH22-89-R-07396 entitled "Field Test of Combined Speed, Alcohol, Safety Belt Enforcement Strategies." This project publicized the enforcement of several highway safety laws *in combination*, rather than enforcement of one particular law. This approach is designed to make enforcement more efficient in raising perceived risk of arrest for each type of violation and also to achieve increased deterrence by creating a perception of more severe penalties for multiple violations occurring in a single incident. We hypothesized that, as a result, deterrence for one category of violation may be enhanced by the perceived severity of sanctions for another.

For example, a strategy may involve publicizing that all nighttime speeding stops will also include administration of a Preliminary Breath Test (PBT) for alcohol impairment (subject to probable cause constraints) and investigation of safety belt and child restraint use. Deterrence may be enhanced for restraint and DWI violations by creating a perception of an increased risk of apprehension brought about by increased nighttime speeding enforcement. For speeding violations, publicizing enforcement may itself increase the perceived risk of arrest. Publicizing such enhanced speeding enforcement may also increase the perceived severity of punishment by creating a threat of a conviction for an alcohol violation and its attendant sanctions.

This combined enforcement concept was also tested in two other sites in this contract, Knoxville, Tennessee, and Wichita, Kansas. The results of these two subprojects are documented in separate reports.

PROJECT SCOPE AND APPROACH

Two distinct types of effort were required in each of the subprojects, (1) design and implementation of the enforcement / PI&E program, and (2) evaluation of that program. The *design and implementation effort* began with the selection of suitable jurisdictions in which to locate the subprojects. This involved contact with NHTSA's regional offices as well as drawing upon our own knowledge of traffic enforcement agencies throughout the country. Once a list of possible jurisdictions and agencies was developed, we set about contacting management staff in those agencies. Initially, the contacts were by telephone and through written correspondence. We then visited agencies that appeared promising to confirm their appropriateness. Criteria used in

selecting sites are discussed later in this report and included those critical to enforcement and those critical to the PI&E effort.

The *evaluation effort* was directed at measuring the effect of the enforcement / PI&E program on the following groups of variables:

- driver awareness of the program;
- driver perceptions of enforcement;
- driver self-reported behavior with respect to speeding, drinking-driving, and seatbelt use;
- measured speed distributions and seatbelt use at several locations throughout the program period; and
- accidents and accident variables related to drinking-driving, speeding and seatbelt use.

The evaluation was designed to measure changes in these variables in the test site over the project period. In addition, a comparison site was sought to help recognize trends that could affect the test site and confound the effects of the program in the test site. The comparison site was chosen so as to match the test site closely as possible except that it planned no special traffic law enforcement program during the project period.

This design would permit one to estimate the effectiveness of the *combined enforcement effort* relative to a *nominal enforcement effort involving no special campaign of any kind.* In addition, we contacted highway safety practitioners and surveyed the literature to learn whether there had been any evaluations of single-strategy speed enforcement programs in jurisdictions similar to our test jurisdictions. If such data were available, it could be combined with the data from our pertinent site pairs to get an estimate of the benefit of a combined enforcement approach compared to a single-violation enforcement approach.

Ultimately, we selected Chattanooga, Tennessee, as the comparison site for the second test site, Lexington, Kentucky. The criteria discussed in the next section were used in selecting Lexington and Chattanooga.

After the sites had been selected, we learned that Chattanooga had the opportunity to implement an intensive speed enforcement campaign supported by a PI&E effort. The project was funded by a state grant from the Governor's Highway Safety program matched with local government funds. Twelve high-accident areas were targeted as the areas where the additional speed enforcement effort would take place.

The Chattanooga speeding crackdown was conducted from March 1991 through September 1991. Six teams, using a total of 24 police officers working on overtime, provided the enforcement. Each enforcement team consisted of one officer operating a speed detection unit and three officers involved in apprehending violators. The teams operated six days a week (excluding Wednesdays) from 7:00 a.m. until 11:00 a.m., 3:00 p.m. until 7:00 p.m. and 11:00 p.m. until 3:00 a.m.

The speeding enforcement effort in Chattanooga was supported by a PI&E program to increase public awareness. The twelve locations were publicized, and two newspapers printed those locations. In addition, radio and television spots were aired

and interviews were given publicizing the crackdown on speeders. Public appearances to groups such as civic and garden clubs discussed the purpose of the program and tried to gain public support. The news media were allowed access to the teams at any time for photo opportunities and interviews while the officers were working. Officers cooperated by answering questions and giving demonstrations. A weekly schedule of specific enforcement locations was made available to the media. However, the timetable was not publicized and, at times, additional locations were covered that week, thereby creating the illusion that more enforcement teams existed. Unmarked and marked police units and motorcycles were used.

Through this program, Chattanooga provided data for analyzing whether the combined enforcement approach was more effective than a single-violation approach. However, Chattanooga could not be considered a "control site" for Lexington as originally planned, since Chattanooga had already implemented its speeding campaign when the Lexington program began.

2 - PROJECT SITES

SITE SELECTION

Our contract called for sites with populations between 200,000 and 500,000. Two categories of criteria were used in selecting sites of this size, those critical to enforcement and those critical to the PI&E effort. *Site selection criteria critical to enforcement* included:

Willingness of police to cooperate. This criterion included the willingness to adhere to the experimental design (discussed later in this report), and the willingness to provide personnel and equipment needed for the enforcement efforts.

Conditions justifying speed enforcement. This criterion was aimed at ensuring that traffic laws, speed limits, and road conditions were such that a program that includes speed enforcement had a reasonable chance of influencing driver behavior.

Availability of data. This included specific data on the coincidence of problem behaviors (e.g., speeding and DWI) in the locality, for the purpose of planning the enforcement campaign. It also included the availability of more general data (accident, arrest, etc.) for determination of program effectiveness. It included the current availability (or reliable prospect of future availability) of independent attitudinal survey data on issues related to the project.

Quality and accessibility of accident data. Computer tapes from a central agency were preferable to hard copy from the local agencies, which would have to be retrieved and keypunched. The detail of information on the accident reports was also important; for example, data which contain the TAD scale for vehicle damage were deemed preferable to those which do not. Also, sites with more extensive police investigation of accidents were preferable to those which rely more heavily on operator reports.

Legal environment. Considerations were the requirements for a speeding citation, the definitions of the various levels of alcohol offenses, the legal techniques for determining BAC, whether roadblocks are permitted, the exact requirements for safety belt use, and the strategies permitted for enforcing safety belt use. It was also important that there would be no new local or state legislation which would affect the legal basis for the enforcement strategies (e.g., repeal of a seatbelt law, or drastic strengthening of the drunk driving laws).

Availability of Comparison Sites. Comparison sites were preferably from the same states. Confounding factors, especially those arising from differences in laws, and in accident data, can make a comparison of sites in different states more difficult. Desirable characteristics of comparison sites were:

- Similarity in general social and economic characteristics.
- Similarity in general characteristics of the Highway Transportation System.
- Similarity in intensity of enforcement of target traffic law violations.
- Similarity in historic traffic law enforcement patterns and trends.
- No plans for changes in current traffic law enforcement and PI&E practices.
- Similarity in historic accident patterns and trends.
- Data availability comparable to those of the test sites.
- Willingness to permit collection of speed and seatbelt use data.

Site Selection Criteria Critical to the PI&E Campaign were:

Willingness of local police agencies to make true commitment to the program. This includes the willingness on the part of the chief(s) to give the project high priority, to make resources available to make this a real and permanent initiative, and to take an active role in both the enforcement and public information activities.

Availability of an effective police-based local coordinator. The potential for success for this type of public information program can rest largely on the effectiveness of the local coordinator. The ability to work well with the public, the media, and the departments cooperating in the program was essential. A person based within the enforcement agency was desired.

Ability to develop widespread local ownership and resources. This project had little funds available for materials and promotions. It was therefore necessary to choose a site that had sufficient resources available to supplement the law enforcement agencies efforts. These resources include support of local businesses, industry and volunteer and civic groups.

Availability of local media. Local television and radio stations, newspapers and other media outlets were necessary to get the messages out to a significant portion of the driving public. Ideally, the site should be its own media market or the main metropolitan area within the market. The support of the media in donating public service efforts to the program, including the development, production and play of public service announcements was an essential ingredient.

The suitability of Lexington as a test site and of Chattanooga as a comparison site with respect to these criteria was assessed and documented in an interim report to

NHTSA. This site pair was recommended in the report, and the recommendation was accepted by NHTSA.

TEST SITE DESCRIPTION

Lexington, Kentucky, is a combined urban-rural jurisdiction with a population of approximately 225,000. Lexington and Fayette County have identical boundaries and are governed by a unified governmental entity, the Lexington-Fayette Urban County Government. The jurisdiction covers 285 square miles and has 987 miles of roads.

About 35% of the population are under 25 years of age, and about 10% are 65 or older. Some 16% are classified as minority (primarily black). Per capita personal income for the county is about $17,000, about the same as the state as a whole. About 10% of Lexington families were below the poverty level in income in 1979, considerably lower than the state as a whole (15%). The unemployment rate in Lexington was 3.2% in 1990, also much lower than that of the state as a whole which had a rate of about 5.8%.

The Division of Police provides law enforcement services for the entire area which includes the urbanized city center as well as a rural area, which has numerous horse farms and two commercial horse racing tracks. IBM and the University of Kentucky are major employers.

Lexington has about 13,000 traffic accidents each year, 2,400 of which are injury accidents. The traffic accident history was quite stable in the three years prior to this project, with no large changes in any of the major types of accidents (**Table 1**). Examination of monthly totals of such accidents revealed no clear trends, either up or down (see, for example, **Figure 1** and **Figure 2**).

Table 1: Number of Various Types of Accidents in Lexington by Year, 1988-1990

	1988	1989	1990
All	13086	13146	12757
Injury	2417	2404	2286
PD	10669	10742	10471
Night	1846	1755	1689
Day	11240	11391	11068
Night Injury	408	406	395
Day Injury	2009	1998	1891
Night PD	1438	1349	1294
Day PD	9231	9393	9177
Alcohol Inv.	476	489	523
Single Veh.	1762	1761	1834
Night SV	515	482	488
Injury SV	657	627	655
Night Injury SV	186	183	195

Currently, the Division of Police is authorized 370 sworn officers and has 340 officers on duty. In the past, DWI enforcement was conducted by officers on general

Figure 1: Traffic Accidents of All Types in Lexington-Fayette County, 1988-1990

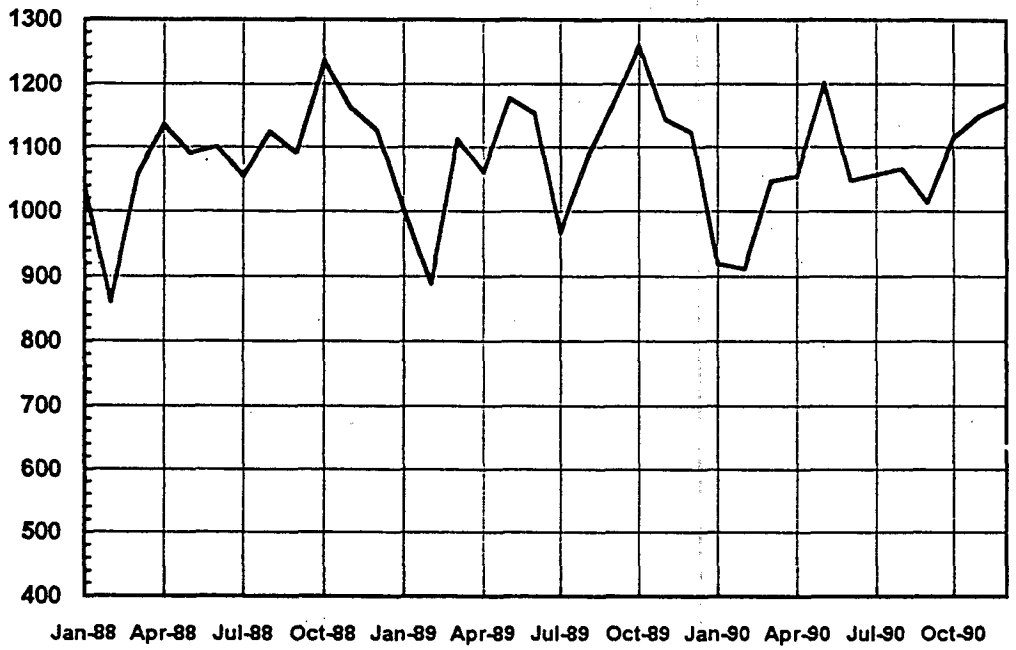
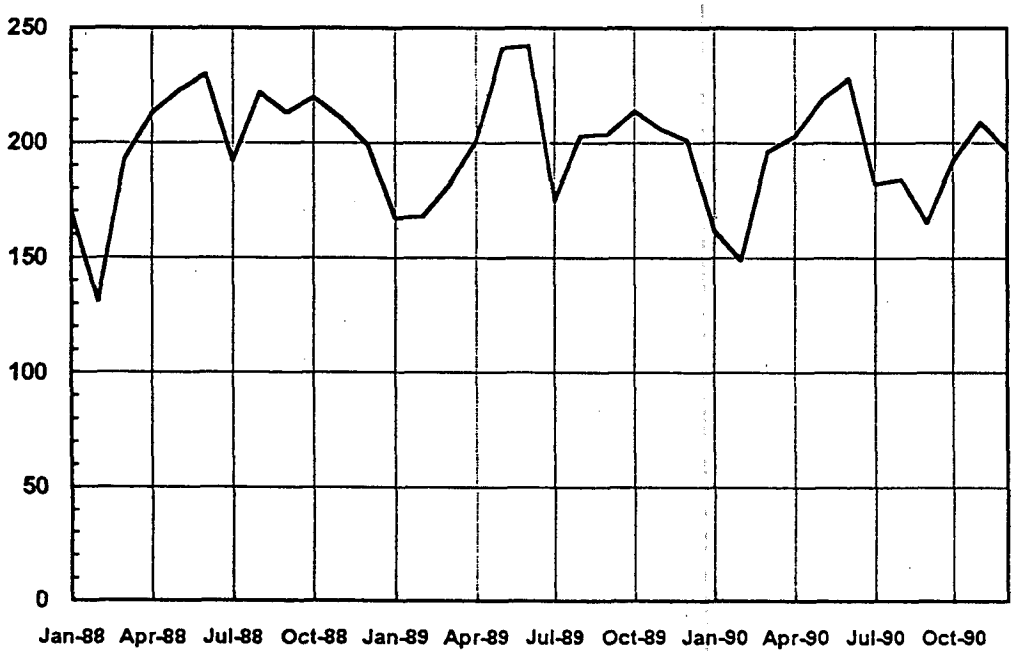


Figure 2: Injury Accidents in Lexington-Fayette County, 1988-1990



patrol. A recent reorganization has created a Traffic Bureau with more direct traffic law enforcement responsibilities.

Lexington started emphasizing DWI enforcement in the early 1970s when it was an ASAP site. Another major emphasis on DWI enforcement was initiated in Lexington in mid-1982 with the Traffic Alcohol Patrol (TAP). This enforcement effort, funded through a Title 402 grant from the Kentucky Highway Safety Standards Branch, consisted of extensive overtime work by police officers working on their days off.

In 1983, all officers received a 40 hour in-service training program on DWI detection and processing with some receiving as much as 80 hours of training. A portion of this training concentrated on NHTSA's Standardized Field Sobriety Tests. In 1983 and 1984, prosecutors were also familiarized with DWI procedures, the standardized field sobriety tests and chemical testing. During the course of the project approximately 175 officers received DWI enforcement training.

After 402 funding stopped, the department changed the work schedule to a 10-hour day, four-day workweek. This created an overlap shift from 10:00 PM to 2:00 AM which, supplemented by department funded overtime from 2:00 AM to 3:30 AM, was used to create a DWI task force of one sergeant and five to six officers who worked Wednesday through Saturday nights.

In 1986, 10 preliminary breath testers were purchased and used primarily by officers assigned to the special DWI enforcement squad. The Department has gradually added additional PBTs so that there are now 70, and they are distributed more widely within the general patrol.

The primary DWI enforcement technique used has been the detection of offenders through visual cues indicated to officers on general patrol. Screening of suspected DWI's with preliminary breath testers was implemented in the middle of the decade. Checkpoints have not been employed as an enforcement strategy with the exception of one media event in 1988.

The DWI arrest rate for the Division is currently at about 2,500 per year. This amounts to about 1% per population served, about the same as that for the state as a whole. DWI arrests in Lexington have remained stable over the past three years after peaking at about 4,500 per year during the first year of the TAP program in 1983.

There apparently have not been any significant enforcement campaigns aimed at speeding in recent years. In 1989, there were 40,217 traffic citations, about half of which were for speeding.

Lexington has a local mandatory seat belt use ordinance (secondary) which went into effect July 1, 1990. There is a $50 fine for non-compliance. The new ordinance was preceded by an extensive PI&E campaign, which probably contributed to the very high initial seatbelt usage rate of about 70%. However, there has been essentially no publicity or strong enforcement of the law since its initiation, so it is quite likely that the usage rate has fallen considerably. The Division was very interested in getting the

usage rate back to something approaching the initial rate and then maintaining it at that level.

The Division is quite active in the area of PI&E. Activities have focused primarily on hard news coverage, supplemented by bumper stickers and extensive public speaking engagements. The Division is very safety-conscious, not only traffic safety, but safety from crime as well. It has developed its own crime watch program (called "Safety Watch") that is strongly supported by PI&E, included some very impressive, well-designed and produced materials. It operates a "Safety City" for second-grade students from all Lexington-Fayette County public and private schools. Safety City is located on a two-acre site and consists of a scaled city-street environment, including battery-powered cars.

In 1987, a new 402-funded program entitled "Community Approach to Traffic Safety" (CATS) was funded at approximately $125,000 per year for three years. This program has funded additional training in accident reconstruction, field sobriety testing and other traffic safety enforcement areas. The CATS project also funds publication of a quarterly newsletter, *Traffic Stop*, which has a circulation of 4,000 and addresses various traffic safety issues, including DWI. The Division was interested in combining the CATS effort with our project and then focussing on combined enforcement of DWI, speeding, and non-use of seatbelts.

The Mayor has supported the Division's program, and the current Chief, a former traffic officer, emphasizes traffic enforcement. Also, the County Commonwealth's Attorney, who came into office in 1985, publicly supports traffic safety issues, including DWI and seat belt use.

In sum, Lexington had an active but stable traffic law enforcement environment prior to this project.

COMPARISON SITE DESCRIPTION

Chattanooga is located in Hamilton County in the mountainous, southeastern part of Tennessee, immediately north of the Georgia border. The city has a population of about 225,000, and the county has a population of about 285,000. As is the case in Lexington, the county (excluding the city) is largely rural. About 35% of the population are under 25 years of age, and about 13% are over 65. About 30% are classified as minority (primarily black).

Per capita personal income for the county is about $17,000. The unemployment rate in the county was 4.2% in 1990.

Chattanooga is one of the nation's oldest manufacturing cities, with more than 26% of its employment in that sector. However, there is no single dominating industry. Chattanooga is the home of the University of Tennessee at Chattanooga and the Tennessee Valley Authority. The Chattanooga area was also a major Civil War battle site and is the home of such tourist attractions as Rock City and Ruby Falls.

Chattanooga is served by two daily papers: the Chattanooga Times in the morning and the Chattanooga News-Free Press in the afternoon. The city also has eight television stations (including one local independent station) and 23 radio stations.

There were 246,000 registered motor vehicles in Hamilton County in 1985. Road mileage by type in 1983 was:

Interstate Highway:	32
State Highway:	227
County Roads:	888
City Streets:	762

The city is served by three major interstate highways--I-75, a north-south highway linking the Great Lakes states with Florida; I-24, an east-west highway linking Chattanooga and Nashville; and I-59, a north--south highway linking Chattanooga and Birmingham, Alabama--and, as a result, a large volume of traffic travels through the city.

As in Lexington, traffic accidents in Chattanooga have also remained stable over the past five years. Each year, there are about 12,000 accidents involving some 2,400 injuries.

In Chattanooga the Chattanooga Police Department and the Hamilton County Sheriff's Department are the primary traffic law enforcement agencies. Some enforcement is performed by the Tennessee Highway Patrol. The CPD has 354 sworn officers, 15 of whom are assigned to the Traffic Division. Chattanooga has a DUI Task Force, which was established in 1984 as a part of a comprehensive, community based drunk-driving program. The Task Force consists of five law enforcement officers whose duties include only drunk driving enforcement.

In 1989, The CPD responded to some 136,000 calls for service. Citations and arrests for traffic law violations were about 28,000, including some 1,500 DUI arrests and an estimated 18,000 speeding citations. CPD management staff informed us that these numbers have been fairly constant over the past several years.

SUMMARY OF CHARACTERISTICS OF THE TEST SITE AND THE COMPARISON SITE

Table 2 compares the counties in which the two sites were located with respect to key site selection criteria and some other pertinent variables. The data shown are for various years prior to the project period for the Lexington experiment. The table indicates that the sites compared very well on all of the characteristics shown.

Table 2: Comparison of Site Characteristics Prior to Project Period (*Circa* 1989)

Characteristic	Lexington	Chattanooga
State located in	Kentucky	Tennessee
Geographical area, square miles	285	539
General social and economic characteristics[1]	Population: 225,000 < 25 yrs: 35% > 64 yrs: 10% Per capita income: $17,000 Unemployment: 3.2%	Population: 285,000 < 25 yrs: 35% > 65 yrs: 13% Per capita income: $17,000 Unemployment: 4.2%
Highway Transportation System	Registered vehicles: xxx,xxx Road mileage by type: 987 Interstate: xx State highway: xxx County roads: xxxx City streets: xxxx	Registered vehicles: 246,000 Road mileage by type: Interstate: 32 State highway: 227 County roads: 888 City streets: 762
Historic accident patterns and trends	Stable	Stable
Intensity of traffic enforcement	Relatively high	Relatively high
Speeding citations	20,000	18,000
DWI arrests	2,500	1,500
Historic enforcement patterns and trends	Stable	Stable
Total calls for police services	xxx,xxx	136,000
Data availability	Enforcement data available from police agencies; accident data and survey data from state.	Enforcement data available from police agencies; accident data and survey data from state.
Permission to collect speed and seatbelt use data	Permission given	Permission given

3 - PROJECT DESCRIPTION

This section describes the local project, the strategies employed, and the general time frame. The description is in narrative form and does not include quantitative measures of activity which are provided in the Section 4, PROJECT EVALUATION.

This project was operated as a local project housed within the Lexington-Fayette County Division of Police. The development and operation of enforcement and PI&E strategies was a local effort. Local activities were coordinated for LPD by Assistant Chief Larry Ball. Mid-America's role was to provide assistance as required in the design of the project and in the development of PI&E materials. The University of North Carolina Highway Safety Research Center participated as a subcontractor to Mid-America with responsibility for assisting in the PI&E effort. Significant local effort was put forth in coordinating the project and in producing PI&E materials.

GENERAL APPROACH

Five different combined enforcement strategies were employed sequentially during a period of approximately one year. Strategy duration ranged from one to five months. The first strategy was preceded by a period of planning and collection of baseline data, and the last strategy was followed by a one-month period of post-operations data collection. A general program theme underlaid all of the strategies, stressing the concept of simultaneous enforcement of DWI, speeding, and occupant restraint laws. The theme selected by the Lexington-Fayette Urban County Division of Police was *Traffic Watch* which is a program within its overall community involvement program called *Safety Watch.*

The logo, which appears on the inside of the enclosed citation jacket represents a roadway and two individuals with the words *Traffic Watch* underneath. This symbol appeared on all materials associated with the program and provided identity with the overall program for each separate PI&E piece.

The lead enforcement strategies of the five campaigns were:

1. *Traffic Watch* Program Introduction.
2. Radar Display with Enforcement Emphasis in School Areas and College DUI Enforcement
3. Saturation Patrol.
4. Child Restraint Enforcement and High Incident Locations.
5. Speeding-Youthful DWI Blitz.

The formal kickoff of the program (Strategy 1) was on July 2, 1991. However, enforcement activity preceded this date by two months, increasing gradually to roughly constant level that was attained at about the time of program kickoff.

PROJECT COMPONENTS

Traffic Watch Program Introduction

The Lexington project kickoff occurred on July 2, 1991 (**Table 3**).

This strategy emphasized the overall renewed departmental emphasis on speed, DUI and seat belt enforcement while concentrating on establishing individual responsibility for compliance with those laws emphasizing that failure to comply will result in arrest and punishment.

Two major PI&E efforts identified with the program which continued throughout the program duration were initiated in conjunction with this strategy. One is a citation jacket, an innovation in this jurisdiction[1]. All officers were provided with a printed folder within which to return every traffic offender's license along with their traffic citation. The folder explained the rationale for traffic enforcement and emphasized the individual's responsibility to comply with the traffic laws, particularly speed, seat belt and drinking driving. It is estimated that 40,000 citation jackets were be distributed during the project period.

The second major PI&E effort associated with this strategy was a Lextran city transit bus painted on all sides with seat belt, DUI and speeding information / enforcement messages. Lextran rotated the painted bus on all city routes throughout the program period for maximum exposure. This bus provided a continuous moving billboard to serve to remind the public of the program. Besides being introduced at a July 2 news event in the Rupp Arena parking lot, the bus appeared in the 4th of July parade. Extensive hard news coverage of its introduction occurred.

Other PI&E activities included a billboard depicting a police car with functioning headlights and blue light and a DUI enforcement message. This was located adjacent to the highest volume intersection in the city. Additionally, the NHTSA sponsored Summertime Blues seat belt enforcement TVPSA's were be distributed to local TV stations at the beginning of July.

Radar Display with Enforcement Emphasis in School Areas and College DUI Enforcement

This strategy began on September 1, and emphasized speed enforcement in school zones and DUI enforcement in college areas. A portable stationary radar display was positioned in local school areas to provide feedback to drivers about their speed and draw attention to school zones and return of children to school. This educational tool was supplemented by intensified speed enforcement in those areas, coupled with enforcement of the adult seat belt ordinance and child passenger safety law. DUI

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[1] Photocopies of some of the PI&E materials are attached.

Table 3: Phasing of PI&E and Special Enforcement Activities in Lexington

Activity	Month													
	Apr 1991	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 1992	Feb	Mar	Apr	May
PI&E														
Campaign 1 - Traffic Watch Program Introduction				▬	▬									
Campaign 2 - Radar Display and Speed / DWI Enforcement						▬	▬	▬						
Campaign 3 - Saturation Patrol								▪	▬	▬				
Campaign 4 - Child Restraint Enforcement and High-Incident Locations											▬	▬	▬	
Campaign 5 - Speeding-Youthful DWI Blitz														▬
Enforcement														
Pre-Kickoff Activity	▬	▬	▬											
Radar Display and Speed / DWI Enforcement														
Saturation Patrols														
Child Restraint Enforcement														
High-Incident Locations Enforcement														
Young Driver Speed Enforcement														
Young Driver Alcohol Sales Enforcement														

enforcement received special emphasis in the University of Kentucky (UK) area as well as at UK events, particularly football games.

DUI enforcement posters and mobiles were developed and displayed in high schools and university student areas as well as being placed in bars and lounges with and in bar and lounge rest rooms. TV and radio spots in support of this back-to-school, Labor Day effort were developed and distributed, and a news release was issued. A DUI enforcement brochure was developed and distributed in high schools through SADD chapters. Supporting PI&E activities included the Labor Day Weekend Alert component of NHTSA's Summertime Blues program.

Saturation Patrols

This strategy used patrol units deployed about every two blocks in a given sector. The patrol force was rotated to other sectors on a weekly basis, so that the entire Lexington area was covered. Each patrol vehicle was be equipped with a radar, and the officers were trained in the use of visual cues for detecting alcohol-impaired drivers. Speeders were stopped and citations given where appropriate. Officers observed for seatbelt usage and DUI during the stop.

Another component of this strategy was a citizens reporting program for DUI offenders using cellular phones.

The kickoff of this strategy was timed to occur just before Thanksgiving so as to capitalize on the November - December media emphasis on traffic safety issues concentrating on DUI. PI&E materials included a news release and TV and radio PSA's encouraging citizen reporting on cellular phones. Efforts were made to capitalize on national holiday publicity programs associated with the season and Nation Anti-Drunk and Drugged driving week.

This strategy kicked off on November 20, 1991.

Child Restraint Enforcement and High Incident Locations

Though Lexington's adult seat belt ordinance is a secondary enforcement measure, the child restraint law is a primary enforcement law. The implementation of this strategy was timed to include National Child Passenger Safety Week and emphasized stringent enforcement of adult and child belt laws as well as concentrated enforcement at high-DUI locations and high-speeding incident locations. A thrust of the PI&E materials in support of this strategy was that though the restraint laws are designed to protect individuals in accidents and law officers will aggressively enforce those laws, speed and DUI lead to those accidents and will also be aggressively attacked at high incidence locations. The use of moving radar was highlighted in this aspect of the supporting materials. PI&E efforts included TV and radio PSA's, a news release and ride-alongs.

Strategy kickoff occurred on February 1, 1992.

Speeding-Youthful DWI Blitz

This was a two-part strategy aimed at young drivers during the prom and graduation season. The strategy focused on teenage drivers and the illegal sale of alcoholic beverages to underage drivers. The first part stressed the use of radar units at locations where there have been a large number of young-driver accidents. The second part supported the first strategy by identifying establishments for validating alcoholic beverage sales. A high-accident area analysis for individuals between 15 and 21 years of age determined the sites for radar enforcement within the city.

PSAs and TV and radio shows involving high school and college students were used to promote the strategy.

The kickoff of this strategy took place on May 1, 1992.

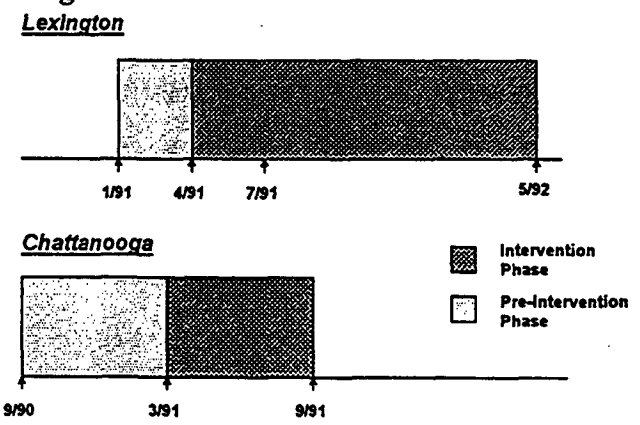
4 - PROJECT EVALUATION

This section presents our evaluation of the Lexington combined enforcement project. The approach, methods, and results of the evaluation are described in detail.

OVERVIEW

As indicated in Section 1 of this report, the evaluation of this project was initially designed to compare various measures of effectiveness in the test site (Lexington) with those in a similar site (Chattanooga) that operated a "nominal" or "control" enforcement program against DWI, speeding, and non-use of seatbelts. However, during the first part of Lexington's program, Chattanooga operated an intensive speed-enforcement campaign supported by PI&E. This development precluded the use of Chattanooga as a control site, but still provided the opportunity to compare the Lexington combined enforcement program with the Chattanooga single-strategy program.

Figure 3: Phases of Activity in Lexington and Chattanooga



The comparison involved two phases of sub-project activity, a pre-intervention phase and an intervention phase (See **Figure 3**). In Lexington, the *pre-intervention phase* extended from January, 1991, through March, 1991; and the *intervention phase* extended from April, 1991, through May, 1992. The formal kickoff of Lexington's PI&E campaign occurred on July 1, 1991. In Chattanooga, the *pre-intervention phase* corresponded to the period covered by the first six months of the Knoxville sub-project which used Chattanooga as comparison site employing a "nominal" enforcement program for the three target behaviors (September, 1990 - February, 1991). The *intervention phase* in Chattanooga corresponded to the time during which Chattanooga conducted its single-strategy speeding program (March, 1991 - September, 1991).

The evaluation was conducted on several levels. At the lowest level, *project activity* was monitored. Two types of activity were generated by this project, enforcement and PI&E. The activity evaluation tracked and assessed the enforcement and PI&E effort over the course of the project. The enforcement data consist primarily of arrests for DWI and citations for speeding and non-use of restraints. The

PI&E data include such measures of exposure as the number of plays of PSAs by given stations, and number of special events held.

Higher levels of project evaluation dealt with the effects of the project activities on variables related to the target driving behaviors, that is, DWI, speeding, and seatbelt use. *Awareness, perceived risk of enforcement, and self-reported behavior* were measured through questionnaires filled out by drivers at driver license stations. The awareness component was concerned both with awareness of project messages as disseminated through PI&E activities, and with the awareness of the enhanced enforcement activity generated by the project. Perceived enforcement risk dealt with the drivers' perception of the risk of getting arrested or ticketed for one of the three target violations, and self-reported behavior addresses the drivers' own reports of violating DWI, speeding, and seatbelt-use laws. The survey was conducted in Lexington and Chattanooga in two waves, shortly before the projects began and shortly after the Lexington project was completed.

A field measurement program was conducted to obtain data on *actual speeding and seatbelt-use behavior*. Vehicle speeds were measured and seatbelt use was observed at several locations in Lexington and Chattanooga. Several waves of measurements were conducted.

Finally, an *analysis of traffic accidents* was performed for both sites. The analysis was concerned with the time variation of accidents and accident losses involving DWI, speeding, and non-use of seatbelts. Accident data were provided by the Tennessee Department of Safety and the Kentucky Department of Safety.

A discussion of the data and data collection procedures used in the project is presented next. This is followed by the evaluation and by a synthesis and interpretation of the results of the evaluation.

DATA AND DATA COLLECTION

Awareness, Perceived Risk of Enforcement, and Self-Reported Behavior

The data for this level of evaluation were collected through a driver survey conducted by the Tennessee Department of Safety at drivers license stations in Lexington and Chattanooga. **Table 4** shows the time phasing of the three survey waves (as well as the time phasing of the field measurement program, discussed later) in relation to the five PI&E campaigns. The instrument used in both jurisdictions is shown in Appendix B. Persons appearing at driver license stations were given the questionnaires to fill out while they were waiting to be served at the stations. Refusal rates were less than 1%.

Questions 1 through 3 sought information on the respondents' reasons for being in the driver license station and their age and sex. Question 4 dealt with the respondents' awareness of public information messages relating to DWI, speeding, and seatbelt use, and question 5 asked about any perceived increase in the enforcement of DWI, speeding, and seatbelt use over the past three months. Question 6

asked about the respondents' drinking frequency, and question 7 asked about the respondents' frequency of drinking-driving. The remainder of the questions (8 through 13) asked at both sites sought information about the respondents' self-reported driving behavior with respect to DWI, speeding, and seatbelt use.

The Lexington questionnaire had three additional questions requested by Chief Ball. The questions were designed to measure the effect of an informational packet given to drivers stopped for a traffic law violation. The packet explained the traffic accident problem in Lexington, told why it was necessary to enforce traffic laws, and described the *Traffic Watch* program. Question 14 asked whether the respondent had received a traffic citation in the past three months; question 15 asked whether he or she had received any written materials after the stop; and question 16 asked whether he or she supported traffic law enforcement.

Measured Speed

Speed data for the entire project were collected according to the following experimental design:

- Observations at each city were made several times during the project. Each of these sets of observations was called a "wave." The first wave was before the project to provide "baseline" data, the seventh after completion of the project. In Lexington, three waves were conducted before the formal kickoff of the project as the ramp-up in enforcement was occurring, and a fourth wave was conducted after the project was formally completed. In Chattanooga, nine waves of data were available, because Chattanooga was also used as a comparison site for our first test site, Knoxville, Tennessee. The relationship between these dates and the periods during which the various enforcement / PI&E campaigns were in effect is also shown in **Table 4**.
- In each city, observations were made at eight different locations. In Chattanooga, one location had to be replaced during the project because the police believed it to be unsafe for data collection during certain hours.
- Observations were made during three time periods called "shifts:" 1 pm - 3 pm, 6 pm - 8 pm, and 8 pm - 10 pm. The design was balanced, so that all combinations of waves, locations, and shifts were covered.

During data collection, measurements of individual vehicle speeds were obtained, together with the lane used by the vehicle, and the vehicle type. In addition, vehicle counts for five minute periods were made to get information on traffic density. The locations were chosen to represent the range of different speed limits at the site, and were also locations where speeding was recognized by the local police as a problem. In addition, the locations were such that an observation vehicle could be safely parked without being obtrusive or affecting speeds. Following these general principles, our subcontractor, The Center for Applied Research (CAR), selected the specific

locations on the basis of information provided by the local police. Speed measurements were made with modified radar guns which operated on a frequency which did not trigger radar detectors, and which could be used unobtrusively.

Seatbelt Usage Observations

Seatbelt usage was observed at the roadside by the same field team that collected the speed data. Seatbelt observations were made in 24 sessions during each of the seven waves. The eight observation locations were at controlled intersections, where vehicles had to stop. Intersections were selected by CAR as to represent a wide range of speed limits and other conditions.

Observations were made during the time period 3pm - 6pm, when no speed measurements were made. Sessions at each location were held on three different days of the week, but no attempt was made to assign them to a specific time within each three-hour period.

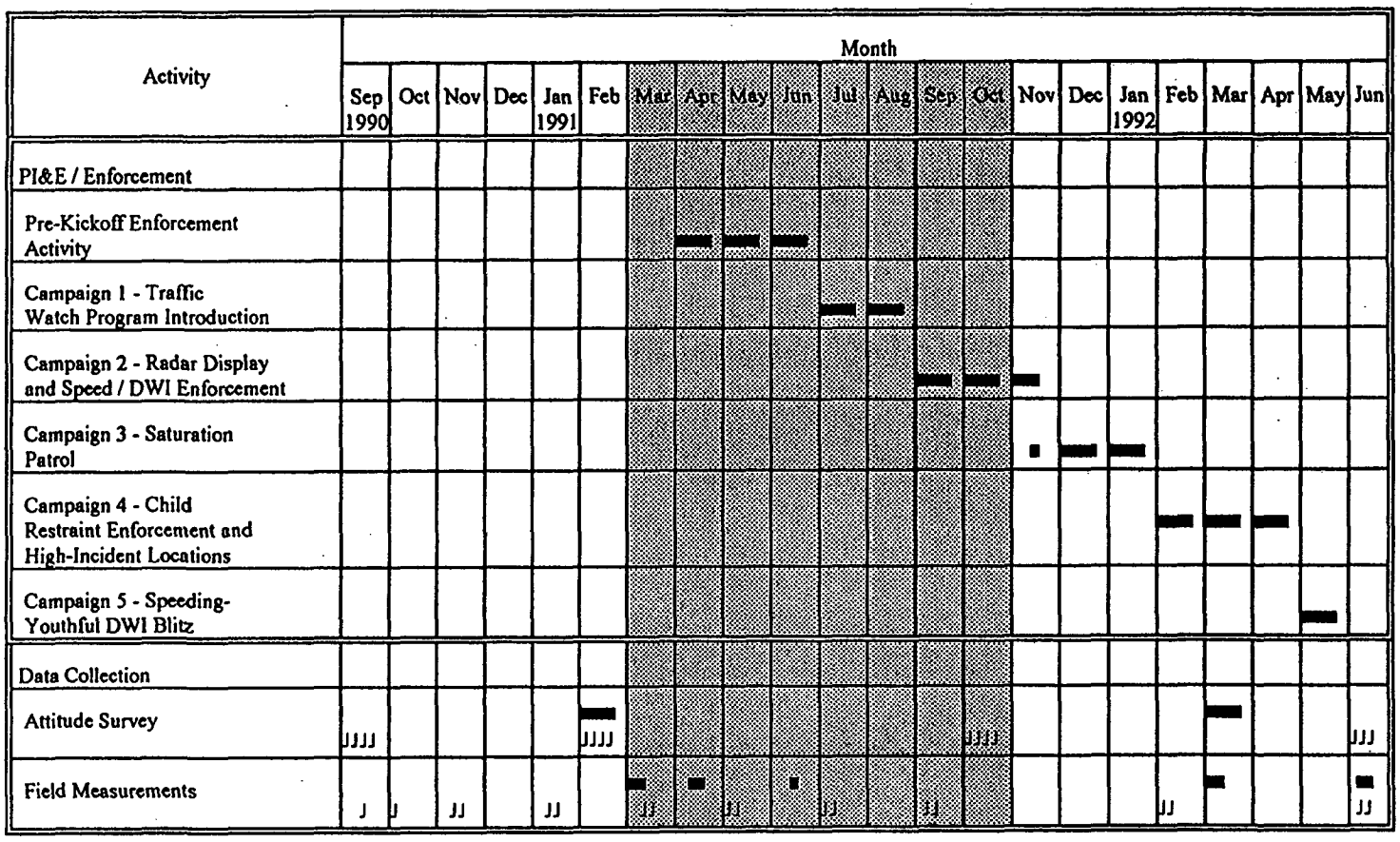
Observations were made by observers looking into the vehicles and observing shoulder-belt and child restraint use for the driver and one front-seat passenger. Vehicle type, driver sex, driver shoulder belt use were recorded in four classes. If a front passenger seat was occupied, passenger sex and shoulder belt-use were recorded in the same categories used for the driver. In addition, seat use by a child, seat use by a child under four years of age, and any child held by the passenger were recorded.

Accident Data

Accident data were taken from computerized files of police accident reports. Five calendar years of data were available, from 1988 through 1992. The files contained data on non-pedestrian accidents investigated by the Knoxville Police Department and the Chattanooga Police Department. Using computer tapes provided by the Tennessee Department of Safety and the Kentucky Department of Safety, Mid-America staff developed monthly counts of various kinds of accidents and accident-related events investigated by each department. Variables reflecting these counts were:

Total number of accidents
Number of injury accidents
Number of property damage accidents
Number of nighttime accidents
Number of daytime accidents
Number of occupants with injuries of any kind
Number of nighttime injury accidents
Number of daytime injury accidents

Table 4: Phasing of PI&E Campaigns in Lexington and Field Data Collection Activity in Lexington and Chattanooga



Notes: 1. Shaded area indicates the period of the Chattanooga speeding campaign.

2. ▬ Lexington

3. JJJJ Chattanooga

Number of nighttime property damage accidents
Number of daytime property damage accidents
Number of alcohol-related accidents (police-reported)
Number of single-vehicle accidents
Number of nighttime single-vehicle accidents
Number of injury single-vehicle accidents
Number of nighttime single-vehicle injury accidents
Number of occupants not injured
Number of occupants with minor injuries
Number of occupants with serious or fatal injuries
Number of speeding-related accidents (police-reported)

EVALUATION RESULTS

Enforcement Activity

The primary available measures of overall enforcement activity were DWI arrests, speeding citations, and citations issued for non-use of restraints. In Lexington, monthly counts of DWI arrests and speeding citations were available for the project period and for a period of 18 months prior to the start of the project. Data on restraint citations were available for the project period and 12 months prior to the start of the project.

The data show that DWI arrests increased from about 200 per month prior to project kickoff to about 225 per month after kickoff (**Figure 4**). Speeding citations increased from 1,100 per month to about 1,600 per month (**Figure 5**). Citations for non-use of restraints increased from about 60 per month to 110 - 120 per month (**Figure 6**).

These data clearly indicate increases in enforcement of all of the target violations. For DWI, the increase amounted to about 13%, but for the other two violations the increases were much more dramatic, 45% for speeding and 100% for restraints. These increases are indicative of a very significant enforcement effort in Lexington during the project period.

The enforcement activity data reflect the "ramp-up" in the enforcement effort preceding the formal kickoff of the Lexington project.

In Chattanooga's program, the number of DWI arrests continued essentially unchanged through the period before, during and after its speeding enforcement campaign at about 130 per month. The number of speeding citations remained unchanged during the "before" period at an estimated 1,500 per month, but in the "during" period increased by about 67% to an estimated 2,500 a month. Speeding citations in the "after" period decreased again to about 2,000 per month. No data were available on the number of seatbelt warnings in Chattanooga.

Figure 4: DWI Arrests in Lexington, January, 1990 - July, 1992

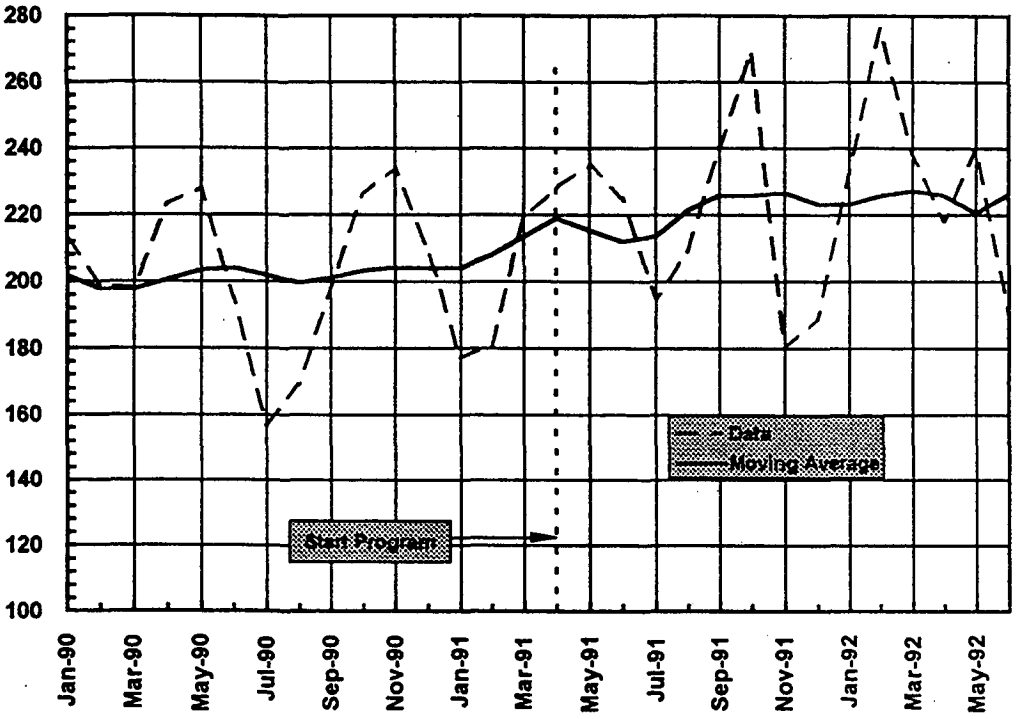


Figure 5: Speeding Citations in Lexington, January, 1990 - June, 1992

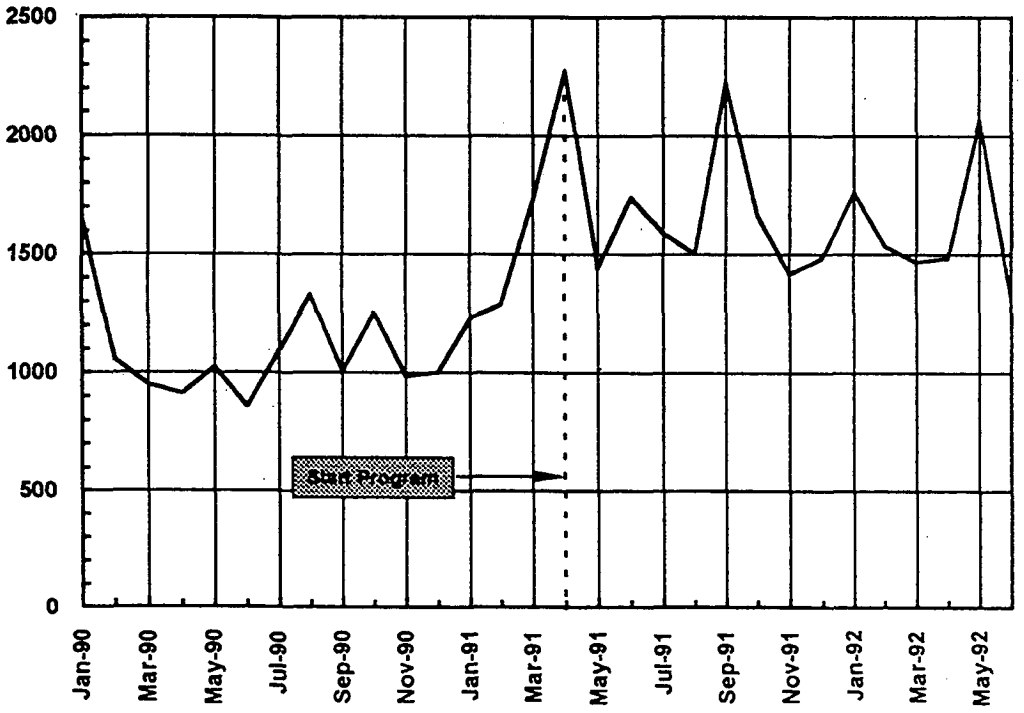
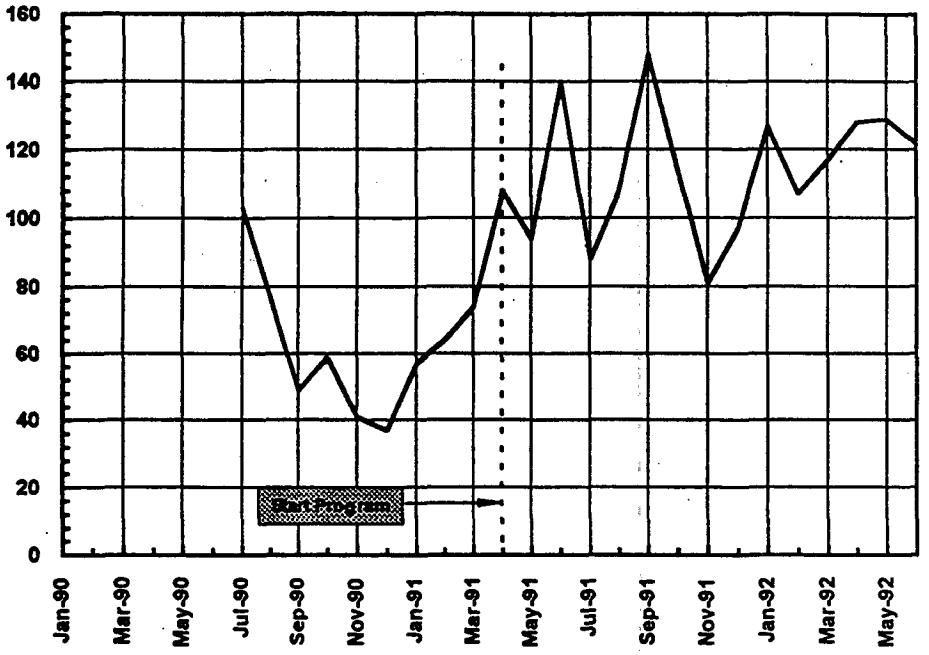


Figure 6: Restraint Citations in Lexington, July, 1990 - June, 1992



PI&E Activity

In Lexington, the Lextran bus and the citation jackets provided continuous exposure of the overall combined enforcement theme throughout the project. These activities were supplemented by hard news coverage, again throughout the project. Additionally, attention was paid to each of the specific enforcement themes in the form of hard news coverage and theme specific materials such as posters and TV-PSA's when the specific enforcement emphasis was being implemented. Mention of the combined enforcement program was incorporated into all community police presentations associated with the overall Safety Watch program as well as other community speaking opportunities.

In Chattanooga, the PI&E program relied almost solely on hard news coverage. This took the form of extensive news coverage of the initiation of the program supplemented by weekly news release indicating the primary enforcement locations for that week. This information was regularly published by the newspapers and announced on drive-time radio shows.

Awareness, Perceived Risk of Enforcement, and Self-Reported Behavior

A total of 1,846 persons responded to the survey, 1,256 in the first wave and 590 in the second and last wave. However, 334 of these respondents had to be dropped because they had not been driving during the prior 90 days, the period over which most of the questions applied. This left a total sample size of 1,512 distributed over

waves and sites as shown in **Table 5**. In Lexington, 55% of these were male, compared to 47% in Chattanooga. These differences in respondent sex between the two sites, though fairly small, were statistically significant at the 0.002 level.

Table 5: Sample Sizes of "Before" and "After" Surveys in Driver License Stations in Lexington and Chattanooga

Site	Before		After		Total	
	N	%	N	%	N	%
Lexington	211	20.5	380	79.2	591	39.1
Chattanooga	821	79.5	100	20.8	921	60.9
Total	1032	100.0	480	100.0	1512	100.0

The age distributions of the 1,512 respondents were closely matched at the two sites for all age groups except for the 50 to 65 group (7.5% in Lexington versus 15.4%).

The formal analysis of the survey results used the SAS GLM procedure[2] using site, survey wave, reason for being in the driver license station (question 1), sex (question 2), age (question 3), and drinking frequency (question 6) as independent variables, and various measures of awareness, perceived enforcement threat, and self-reported behavior as dependent variables in the linear model. Thus, the analysis of *awareness of DWI messages* employed a model of the form:

$$q_{4DWI} = c_1 s + c_2 w + c_3 q_1 + c_4 q_2 + c_5 q_3 + c_6 q_6 + \epsilon$$

where q_{4DWI} was the response to question 4 indicating awareness (=1) or non-awareness (=0) of a DWI message, s was the site (Lexington or Chattanooga), w the wave ("before" or "after"), and the variables q_1 to q_6 the responses to questions 1, 2, 3, and 6, respectively. The model permitted us to examine the effect of site and wave on the various dependent variables, adjusted for "reason," sex, age, and drinking frequency.

The results are summarized in **Table 6** which shows the significance (if any) of any changes between the "before" wave and the "after" wave. The results are discussed below for each of the three target violations.

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[2] GLM is an abbreviation for Generalized Linear Model which combines regression, analysis of variance, and analysis of covariance into a single analysis procedure.

Drinking-Driving. Only non-abstainers were considered in this analysis. There were no significant changes between the "before" and "after" waves for either site for any of the dependent variables.

Speeding. Neither awareness nor self-reported behavior changed significantly in Lexington, but there was a significant reduction in perceived enforcement as measured by perceived increase in enforcement and perceived change in enforcement risk.

In Chattanooga, there was also no change in awareness or self-reported behavior, but there was a highly significant *increase* in perceived enforcement.

Seatbelt Use. Lexington showed a decrease in awareness and perceived increase in enforcement risk, but no change in increased enforcement of self-reported behavior. Chattanooga showed no change in any of the dependent variables.

Informational Packet. The responses to the questions relating to the informational packet given to Lexington drivers who were stopped for a traffic violation (question 14, 15, and 16) revealed no significant difference in the percentage of citations reported in the "before" wave versus the percentage reported in the "after" wave. However, a slightly higher (but non-significant) percentage of respondents reported receiving the packet in the "after" wave than in the "before" wave.

Persons who received a citation as a result of their stop were *significantly* more likely ($p=.06$) to have received materials in the "after" wave than in the "before" wave (48% vs. 20%). There was no significant change from the "before" wave to the "after" wave with respect to the support voiced for traffic enforcement, either among those who received a citation or those who did not. Drivers who received a citation were slightly less likely to support traffic enforcement (89%) than were drivers who did not receive a citation (82%); however, this difference was not statistically significant.

Measured Speed

For each session[3], the following speed characteristics were calculated from the individual measurements, separate for the two lanes, if there was more than one lane:

- Average speed
- Average speed of vehicles exceeding the speed limit (average "excess" speed)
- Percentage of vehicles exceeding the speed limit
- Percentage of vehicles exceeding the speed limit by at least 5 mph
- Percentage of vehicles exceeding the speed limit by at least 10 mph

[3] A measurement session is defined as the time period during which a set of measurements were taken at a given location during a given shift.

Table 6: Summary of Analysis of Driver Survey in Lexington and Chattanooga

Measure	Site	
	Lexington	Chattanooga
DWI		
Awareness	ns	ns
Enforcement	ns	ns
Enforcement Risk	ns	ns
Behavior	ns	ns
Speeding		
Awareness	ns	ns
Enforcement	- (*)	+ (***)
Enforcement Risk	- (**)	+ (***)
Behavior	ns	ns
Seatbelts		
Awareness	- (**)	ns
Enforcement	ns	ns
Enforcement Risk	- (**)	ns
Behavior	ns	ns

Notes:

1. Results for DWI considered non-abstainers only.

2. + denotes a significant positive change
   - denotes a significant negative change
   ns denotes no significant change

3. (*) $p < .05$
   (**) $p < .01$
   (***) $p < .001$

In addition, for each of these measures, its "standard error" was calculated. Note that this is not really an error in the usual sense of the word, but that it is a consequence of the random variation of the actual speeds[4].

Average speed is usually of little interest in the context of speed enforcement, if the majority of drivers drive below or near the speed limit. Their travel habits should not be changed by enforcement; thus the effect of reducing the speed of relatively few speeders should have little effect on the average speed. The *average excess speed*, however, should show a greater effect; still, it is heavily influenced by the many vehicles which travel only little over the speed limit, against which usually no enforcement action is taken. However, a few vehicles with very high speeds can influence this average; if their speeds are dramatically reduced, it could have a noticeable effect on the average excess speed.

The *percentage of drivers exceeding the speed limit* contains a large number which exceed the limit only by a small amount. In this case, it makes no difference even if the highest speeds are dramatically reduced. Therefore, this measure should not be a very sensitive measure of enforcement effects.

The most meaningful measure of speeding for this project is the *percentage of drivers exceeding the speed limit by at least 10 mph*. Since enforcement actions are often taken only when the limit is exceeded by at least 10 mph, this percentage should be the most sensitive measure of the effectiveness of enforcement. The *percentage of drivers exceeding the speed limit by at least 5 mph* is also a useful measure if enforcement actions carry over to such violations.

We speculated that traffic density might influence travel speeds. Therefore, some preliminary analyses included the 5-minute vehicle counts as variables. Since no effect of this variable appeared, it was not used in subsequent analyses.

There were usually some, though small, differences in speeds between the lanes at one location. Therefore, most analyses used location/lane combinations as one factor. Because the results differed only little from those combining both lanes, if any, at each location, some analyses used combined data for both lanes. We also found no significant difference was found between the first and second "shift." Therefore, these were later combined into one afternoon period (1 pm - 8 pm).

In our analyses of the Lexington data, waves 1 to 3 and waves 4 and 5 were grouped and treated as "before" and "after," respectively. The SAS GLM procedure was applied using measurement location, measurement period (before and after), and time of day (day and evening) as dependent variables. The results of the Lexington analyses are shown in **Table 7**.

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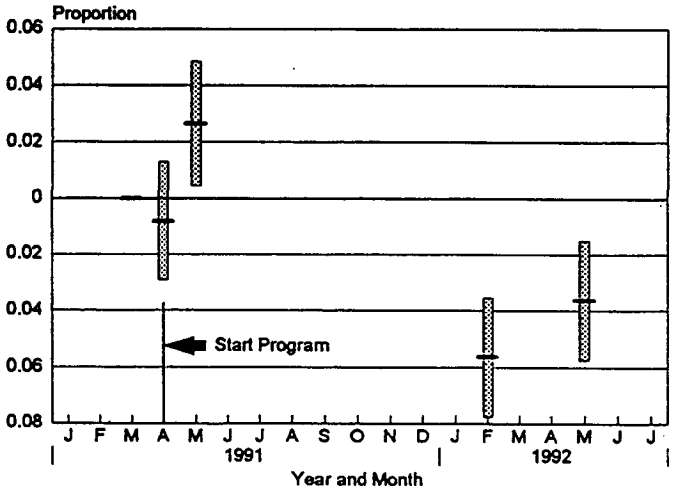
[4] Standard errors are discussed in more detail in Appendix C.

Table 7: Changes in Speed Measures From "Before" Waves to "After" Waves in Lexington

Measure	Overall Average	Change	Std. Error	Significance level, p
Mean Speed, mph	45.7	-0.68	0.18	0.0003
Mean Excess Speed, mph	6.2	-0.28	0.12	0.0224
% Over Limit	78	-4.3	1.3	0.01
% > 5mph Over Limit	40	-5.2	1.4	0.0003
% > 10mph Over Limit	12	-1	0.8	0.2198

Figure 7: Relative Proportion of Vehicles Exceeding the Speed Limit by More Than 5 mph in Lexington



The overall picture is clear: all measures show a reduction in speeding in Lexington (though the reduction in mean speed does not necessarily imply a reduction in speeding: it is conceivable that this is due to drivers below the speed limit slowing down). With the exception of the percentage exceeding the limit by 10 mph or more, all are statistically significant. Even for this variable, the change is about 8% (1/12), and is not significant because of the relatively large standard error, presumably due to the small numbers of high speeders. The percentage exceeding the limit and the percentage exceeding the limit by 5 mph or more show reductions of 6% and 12%, respectively. *These reductions are strong indicators of a successful program with respect to speeding.* A look at the graphs of the speed

data further supports this conclusions, because they do not show smooth trends, but clear indications of a sudden drop (**Figure 7**).

In Chattanooga, average speeds showed a clear drop between waves 3 and 4, and were constant in the "after" period, and constant in the "before" period, though there is a very weak suggestion that there might be a drop from 1 to 2. The proportion of vehicles exceeding the speed limit showed no very clear picture. The results for this measure were compatible with a continuously declining trend as well as with a drop between waves 3 and 4, and constant values "before" and "after."

Speeding at 5 mph above the limit in Chattanooga showed a clear drop between waves 3 and 4, constant values "after," and also "before." There is a very weak suggestion of a decline between waves 1 and 2. Speeding at or above 10mph the limit showed no change over waves 1-3, then a drop of about 8%, and constant values afterwards.

In short, speeding in Chattanooga declined strongly between waves 3 and 4 when Chattanooga's speed program began. There was very little, if any, change in the "before" period, and only random fluctuations in the "after" period. *These reductions and their patterns are consistent with a successful speeding enforcement program in Chattanooga.*

Observed Restraint Usage

The analysis of seatbelt use was similar to the analysis of speeds. Since there were 24 locations in each city, and all observations were made during three hours in the afternoon, no shift factor was included. However, day of week was used, and turned out to be a significant factor. The data showed moderate overall seatbelt usage rates in both Lexington and Chattanooga, but somewhat higher in Lexington (57%) than in Chattanooga (42%).[5] However, there was no significant variation in usage rate over the measurement period in either site. *The analysis found no indication whatsoever of any program effect on seatbelt usage either in Lexington or Chattanooga.*

Accidents

As indicated above, our measurements of vehicle speeds showed a decline in all measures of speeding, and the credibility of this decline was enhanced by evidence of a very large increase in speeding-enforcement intensity. Further, there was also evidence of increased DWI enforcement intensity, although the increase was not nearly as large as the increase in the intensity in speeding enforcement. These findings suggested that related accidents might also have decreased after the beginning of the

[5] These usage rates are the rates averaged over the 24 measurement locations in each site. Standard errors were ± 7% for both Lexington and Chattanooga.

Traffic Watch program, and we conducted a time series analysis of both speeding-related accidents and alcohol-related accidents. The nature of these analyses and their results are described below.

Alcohol-Related Accidents. Several different time series of types of accidents indicating possible alcohol involvement were examined.

The most direct measure of alcohol involvement available is police-reported alcohol involvement. It is well known that this is neither a comprehensive, nor a reliable measure; however, because of its directness, we did analyze it.

We also studied various surrogate measures or proxies of alcohol-related crashes. There are a number of possible proxies for alcohol-related accidents, including all nighttime accidents, nighttime injury accidents, nighttime single-vehicle accidents, and nighttime single-vehicle injury accidents. (Due to low numbers, fatal accidents could not be used in this study.) None of these proxies is *a priori* the "best" proxy. An accident class which has a very high proportion of alcohol-related accidents can have numbers so small that an effect may not be recognizable, whereas an effect might be recognizable in a class with a lower proportion of alcohol-related accidents, but with larger case numbers. Therefore, all four classes indicated above were used for the analyses.

The second question is: what are good comparison groups? Again, there is no *a priori* best choice. For each class of accidents, the same class at the comparison site is an obvious possibility. Another possibility is contrasting groups at the same site. Thus, for nighttime accidents, daytime accidents at the same site are also a possibility. Similarly, for nighttime injury accidents, daytime injury accidents as well as all nighttime accidents appear plausible. For nighttime single-vehicle accidents, nighttime multi-vehicle accidents, and daytime single-vehicle accidents are plausible. Finally, for nighttime single-vehicle injury accidents, all nighttime single-vehicle accidents, all nighttime injury accidents, and also daytime single-vehicle injury accidents are possible choices. To determine which of these choices were actually suitable as comparison groups, models for the time prior to the intervention were studied, and we only used those where the effect of the comparison group was significant at least at the 20% level. In addition to the term for the comparison group, a time trend and a seasonal component were allowed.

Often, comparison data are used to calculate ratios of the study accidents to the comparison accidents and to analyze them, implicitly assuming that such ratios would remain constant over time, or at least show only a simple time trend. Our experience has shown that, in general, this is not a good practice. Often, such ratios show complicated time patterns which are not readily explainable, so that one cannot exclude the possibility that changes observed at the time of the studied intervention are not also due to these unexplained factors. It is also easy to see that in some cases ratios can give grossly misleading models. It is preferable to use a comparison variable as an independent variable in a regression model, because such a variable includes a constant ratio as a special case, but allows modeling more complicated conditions.

A large number of models were developed. We only retained those where the comparison variable turned out to be suitable (as defined above), and an intervention effect appeared significant, both at least at the 20% level. Trends and seasonal patterns were omitted if they did not reach this level. Because of the large number of models tried, the significance levels for the models retained (as obtained by standard statistical programs) are not valid; the actual significance levels will be lower because of the possibility that a model's significant effect was due to chance alone.

All of the proxy measures of alcohol-related accidents in Lexington showed a decrease that during the *Traffic Watch* program, and two proxies, nighttime accidents and nighttime single-vehicle accidents, decreased significantly (**Figure 8** and **Figure 9**). The decrease in nighttime accidents was about 8.5%, and the decrease in nighttime single-vehicle accidents was 15%. There was no evidence of a change in any of the proxy measures of alcohol-related accidents in Chattanooga.

Speeding-Related Accidents. Only one measure of speeding-related accidents (minor injury accidents) decreased in Lexington, but that decrease (17%) was statistically significant (**Figure 10**). By contrast, all injury accidents showed a significant decrease in Chattanooga (8%).

SYNTHESIS AND INTERPRETATION OF RESULTS

In Lexington, the speed measurement data showed a drop in all measures of speeding during the program period. All of these reductions were statistically significant except the reduction in the percentage of vehicles exceeding the speed limit by at least 10 mph. In Chattanooga, there was a statistically significant drop in all measures of speeding, *including* the percentage of vehicles exceeding the speed limit by at least 10 mph.

The analysis of accident data in Lexington showed a significant, 17% decrease in minor injury accidents, but no decrease in surrogates of more serious injury accidents. This result is consistent with the finding that lower-speed violations decreased significantly, but higher-speed violations did not.

There was no measurable difference in seatbelt use in Lexington over the period of the *Traffic Watch* program, nor in Chattanooga over the period monitored in our evaluation. (However, Lexington started its program with relatively high belt-usage rates, and was at least able to maintain these rates throughout the program period.) Thus, the reductions in injury accidents in both jurisdictions cannot be attributed to increased seatbelt usage, but are more likely due to reductions in speeding.

Figure 8: Nighttime Accidents in Lexington, All Accidents as a Control, ARIMA Model

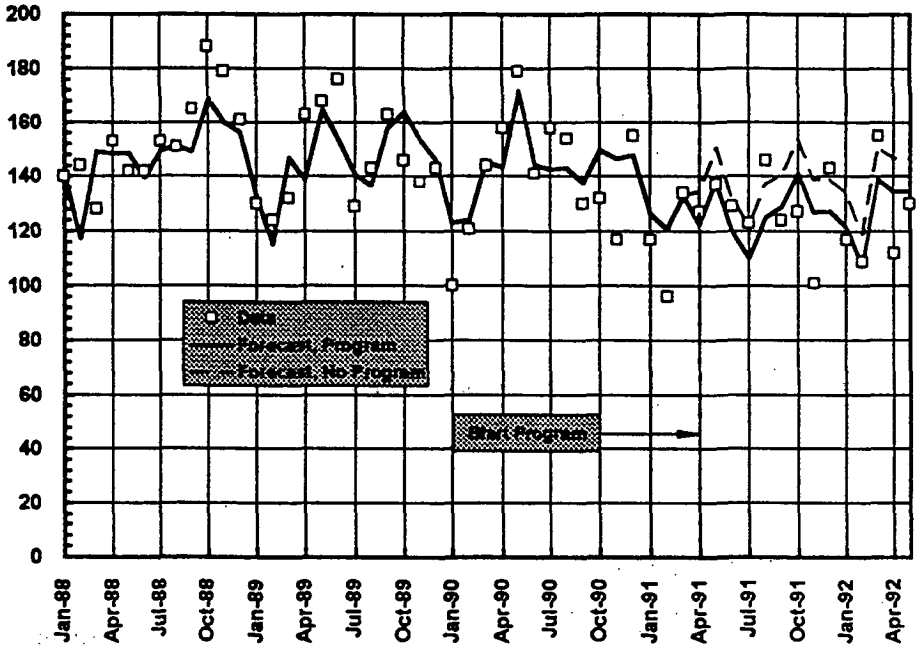


Figure 9: Nighttime Single-Vehicle Injury Accidents in Lexington, All Accidents as a Control, ARIMA Model

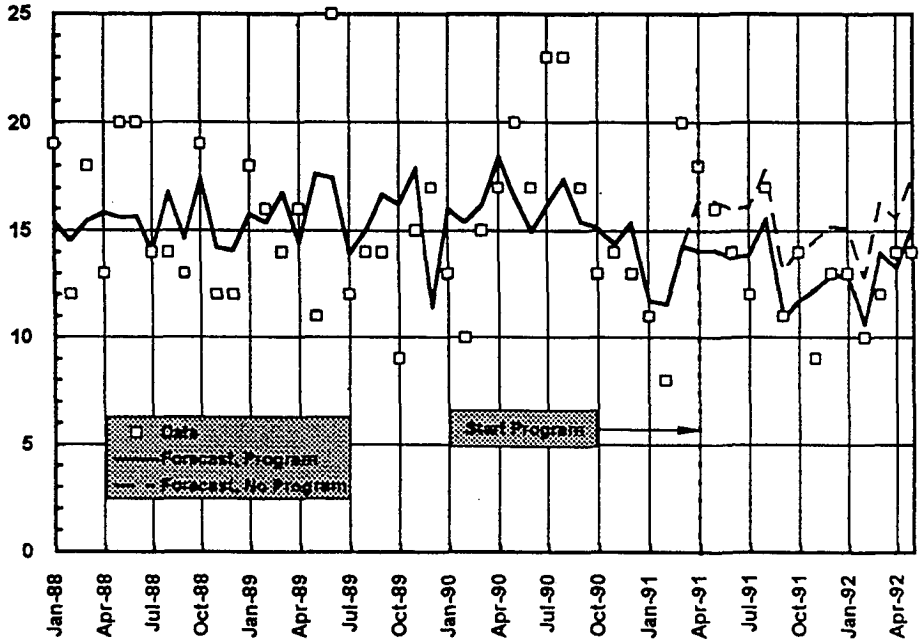
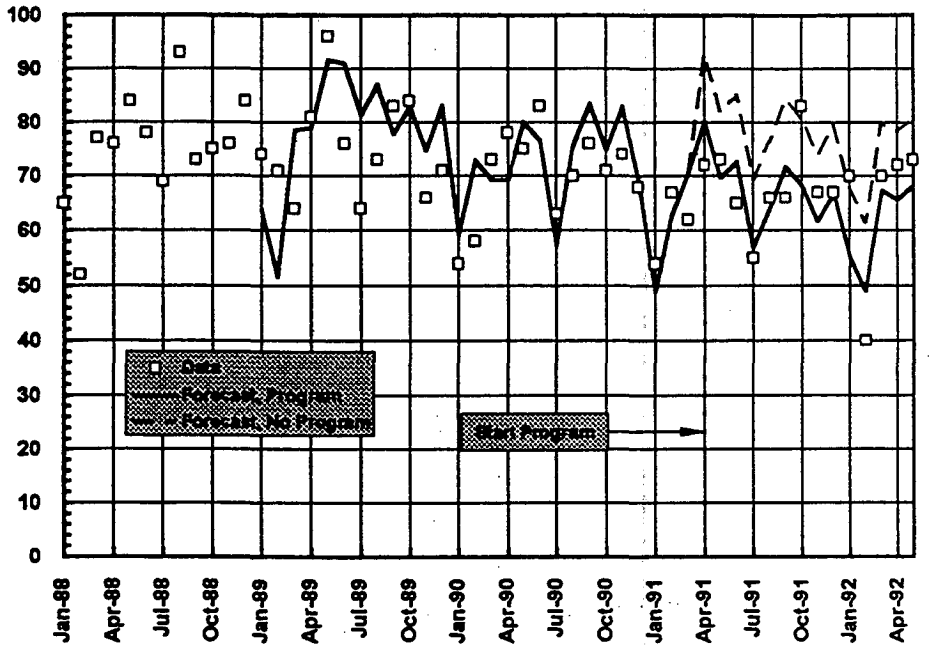


Figure 10: Minor Injury Accidents in Lexington, Day Injury Accidents as a Control, ARIMA Model with 12-Span Differencing



Since both programs were supported by heavily-increased enforcement activity and a substantial PI&E effort against speeding, the finding of a reduction in speeding in both sites is not surprising. Lexington also increased its DWI enforcement significantly and accompanied its anti-DWI effort with increased PI&E activity. Reductions in alcohol-related accidents then occurred in Lexington. By contrast, Chattanooga did not mount any increased effort in DWI enforcement, and found no decrease in alcohol-related accidents.

The driver-survey data provide no support for the findings from the speed measurement data that speeding generally decreased in Lexington over the project period. There was no change either in awareness of speeding messages or in self-reported speeding, and perceived enforcement of speeding actually decreased. However, in Chattanooga, the survey data were a little more consistent with the reductions in observed speeding: awareness and self-reported behavior did not change, but perceived enforcement increased very significantly. The survey data provided no evidence of any meaningful change in awareness, perceived enforcement, or self-reported behavior with respect to DWI or seatbelt use in either site over the project period.

5 - CONCLUSIONS

We conclude that Lexington's combined enforcement program was effective against both speeding and DWI. All measures of speeding were decreased, and especially those that were related to lower-speed speeding violations. The percentage of vehicles exceeding the speed limit by at least 5 mph decreased by 14%, and minor injury accidents decreased by 17%. Both of these decreases were statistically significant. Statistically significant reductions in alcohol-related accidents in the 10% range were also observed.

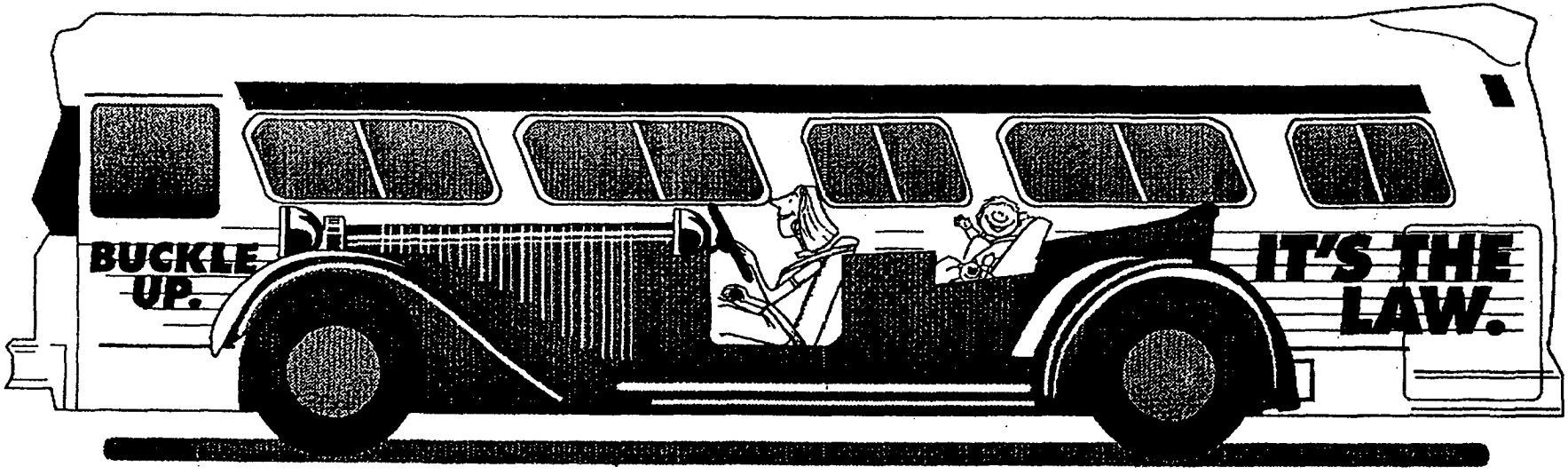
The Lexington program did not result in any increase in seatbelt usage, but it was able to maintain the high rates Lexington was experiencing when its combined enforcement program began.

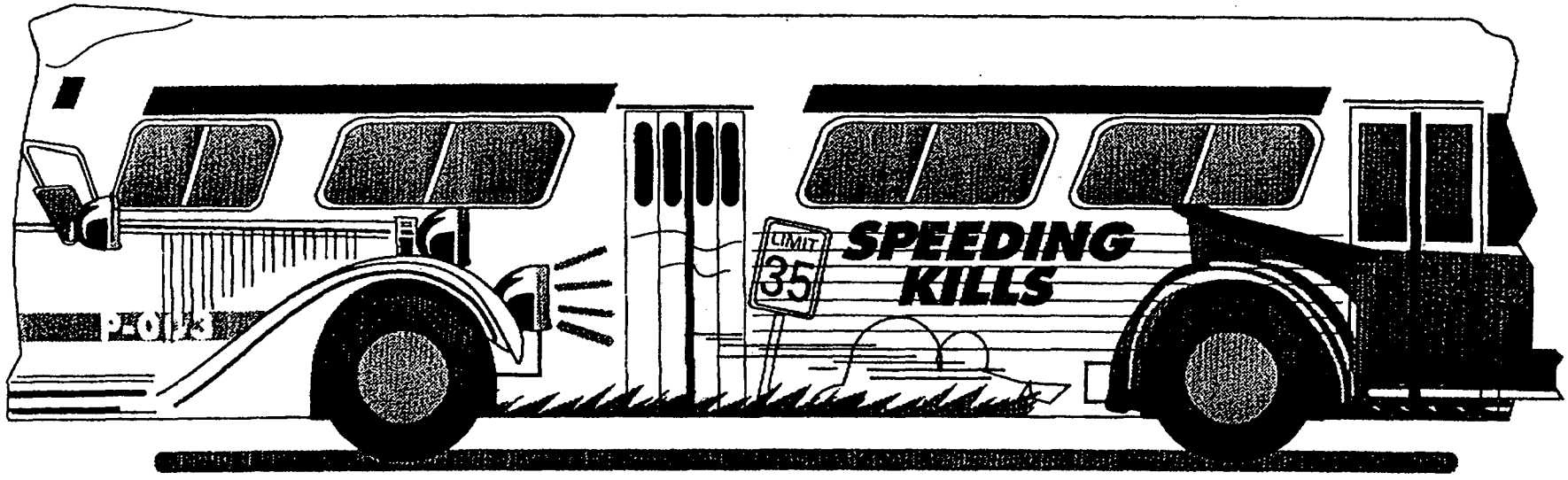
There is also evidence that Chattanooga's speeding campaign was effective against speeding. All measures of speeding decreased during the campaign, including the percentage of vehicles exceeding the speed limit by at least 10 mph (8%). Injury accidents decreased significantly also by about 8%. The Chattanooga campaign had no apparent effect on seatbelt usage or DWI.

In some respects, the Lexington combined enforcement program had higher highway safety benefits overall than did Chattanooga's single-violation program, because the Lexington program achieved significant reductions against DWI in addition to speeding and speeding-related accidents.

Thus, this field test shows that a combined-enforcement program can be effective against at least two its target violations, speeding and DWI. The field test suggests that effectiveness against a third violation, non-use of seatbelts, might also be achievable, especially in jurisdictions that have low usage rates prior to the introduction of a combined enforcement program.

APPENDIX A - PI&E MATERIALS


BUCKLE UP.
IT'S THE LAW.


LIMIT
35
SPEEDING
KILLS

Lexington Police
Happy New Years
30 Second PSA

SFX: Spot starts with New Years Eve song & people celebrating at a party. (Include party noise makers...horns & winding devices.)

SFX: People getting into a car: the group is laughing & having a good time and can be heard in the background- Dropping Keys, car doors opening & closing, car starting, and driving away.....

SFX: Police Siren- Car being pulled over

Announcer- as a police officer:
"Your under arrest for DUI....Driving Under the Influence:"

SFX: Jail door slamming shut!

Announcer: Jail is not a great place to spend the holidays!

Announcer: This reminder has been brought to you by the Lexington Fayette Urban County Division of Police.

Lexington Police Radio PSA's
12/23/91

Lexington Police- DUI
30 Second PSA- Tequlia

(Starts with music...song-Tequlia & a crowd of people at a party)

HAVE A GOOD TIME & ENJOY THE PARTY....BUT REMEMBER.....

IF YOU DRINK AND DRIVE.....(SFX....Police Siren)

THE PARTIES OVER!...(SFX....jail cell door slamming shut)

This message brought to you by the Lexington-Fayette Urban County Division of Police!

(SFX...End spot with the end of the tequlia song!)

Lexington Police PSA
When the Laughter Stops
30 Second PSA

SFX: (PSA starts with people leaving a party)

SFX: People getting into a car: the group is laughing & having a good time and can be heard in the background- Dropping Keys, car doors opening & closing, car starting, and driving away.....

SFX: Police Siren- Car being pulled over

Announcer: Drinking & Driving- when the laughter stops!

SFX: Jail door slamming shut!

Announcer: DUI is know laughing matter!

Announcer: This reminder has been brought to you by the Lexington Fayette Urban County Division of Police.

SFX: Jail Door.....

Following is a recap of the Lexington Police Department public service announcements aired on WTVQ-TV, NewsChannel 36 for the time period from June 19, 1992 to June 30, 1992:

Date Aired	Number
6/19	2
6/20	2
6/21	1
6/22	2
6/23	4
6/24	4
6/25	4
6/26	3
6/27	3
6/28	5
6/29	3
6/30	4
Total	37

Total spots aired in June: 76. ROS rate for :30 spot: $40.00, for a total $ amount of $3040.00.

These announcements are scheduled to air through July 30, 1991 with a similar schedule.

Marnie MacDonald
Community Affairs Director

Also, Remember To Buckle Up. Doing So Can Save Your Life, And In Our Community It's The Law.

Lexington-Fayette Urban County was the third city in the U.S. with a seat belt law, and has a 75% seat belt usage rate, which is one of the highest in the nation. Statewide in Kentucky, 86% of vehicle occupants killed were not restrained.

This information provided by

Lexington-Fayette Urban County Division of Police,

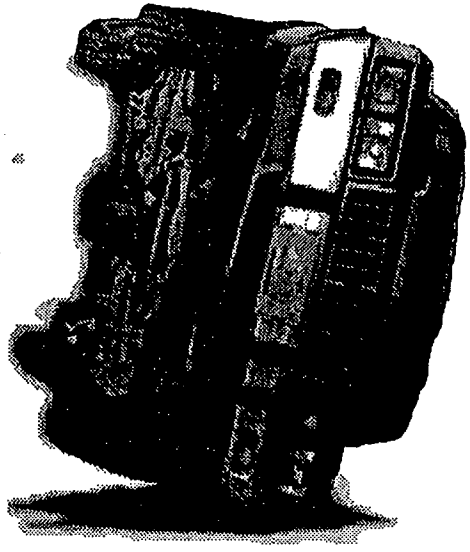
(606) 258-3636

Bureau of Community Services

TrafficWatch

Partially paid for by Highway Safety Funds

IT'S CALLED DRUNK DRIVING



IF YOU DRINK AND DRIVE, IT'S ONLY A MATTER OF TIME.

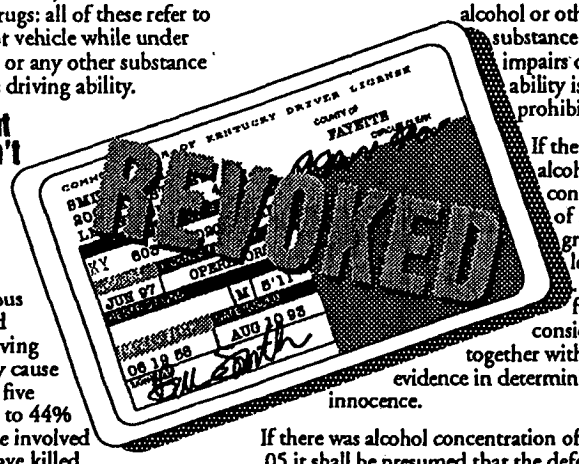
Being arrested for DUI (Driving Under the Influence) is, if you're very fortunate, only expensive and embarrassing. For openers, you'll be handcuffed and put into jail. Those who have been through this describe it as a most unpleasant experience. Your license may be revoked. Also, you will suffer the public humiliation of having your name in the paper for DUI arrest, plus going through a trial. By the time the process is finally over, you will find yourself many, many dollars poorer due to fines, counseling costs and tremendously increased auto insurance rates. That is, if you can find a company that's willing to insure you.*

* Major insurance companies automatically review whether they will continue to provide coverage. A single DUI conviction can result in cancellation of auto insurance. In many cases companies drop a person convicted of DUI - and sometimes the entire family. If this happens, it means everyone in the family has to go to a company that handles high-risk auto insurance. Typically, insurance costs at least double. Let's look at examples: An occasional driver of a family "compact" car, age 18, no violations, is paying about $485 every six months. If convicted of DUI, this cost will go to $1,981 every six months - that is if insurance can even be obtained. Now let's take a look at what can happen to the parents (let's say age 40, and no violations.) Their individual rates will increase from $293 to $654 every six months. In many cases a convicted DUI driver under age 21 cannot get auto insurance coverage at all.

They're All The Same - It's Called Drunk Driving

DWI (Driving While Intoxicated) DUI (Driving Under the Influence) and Use of Intoxicants or Other Drugs: all of these refer to the operation of a motor vehicle while under the influence of alcohol or any other substance which may impair one's driving ability.

When an accident happens, you can't take it back.



Ask anyone who's been there. However, some people who drink and drive don't get off this easily. Many cause serious injury to themselves and others. Worse, their driving under the influence may cause a death. (Over the past five years in Kentucky, 39% to 44% of all fatal accidents have involved alcohol.) People who have killed someone while DUI say they live with it every day - for the rest of their lives. Then again, some who drive under the influence don't have to worry about it - or anything else for that matter. They kill themselves by getting behind the wheel after drinking.

Legislators, law enforcement officials, and concerned citizens are determined to stop DUI related injuries and deaths. This is being done partly by increasing penalties for DUI offenders. As of July 1st, 1991, a stricter DUI law emphasizing both penalties and rehabilitation went into effect. Up-to-date information on fines, jail time and loss of license are detailed in this brochure. Take a moment to read this information and think about the possible consequences. The next time you consider getting behind the wheel of a car after drinking, remember how unpleasant and expensive - perhaps even deadly - just one DUI ride can be.

What exactly does DUI mean under the law?

Operating a motor vehicle with a concentration of .10 or more or while under the influence of alcohol or other substance which impairs driving ability is prohibited.

If there was an alcohol concentration of .05 or greater, but less than .10, that fact shall be considered together with other evidence in determining guilt or innocence.

If there was alcohol concentration of less than .05 it shall be presumed that the defendant was not under the influence of alcohol.

Implied Consent Law

The law is based on the assumption that all licensed drivers accept the privilege of driving on the condition they will consent to an alcohol or substance abuse test if arrested for DUI.

If a driver refuses to take an alcohol or substance test, license revocation is automatic.
First refusal - 6 months
Second refusal - 18 months
Third refusal - 36 months
Fourth refusal - 60 months
(all above apply within a five year period)

Caution: If a driver under the age of eighteen is convicted of DUI, their license will be revoked for a period of time based on number of convictions or until they reach their eighteenth birthday, whichever is longer.

Sentencing if found guilty of DUI (within a five year period):

1 First Offense

A fine of not less than $200 nor more than $500, or imprisonment in the Urban County jail for not less than forty eight hours nor more than thirty days, or both.

Defendant may apply to judge to enter community service for not less than forty eight hours and not more than thirty days in lieu of fine or imprisonment, or both.

License revoked for 90 days.

$150 service fee and attending an alcohol/drug treatment education program at defendant's expense.

2 Second Offense

A fine of not less than $350 nor more than $500 and imprisonment in the Urban County jail for not less than seven days nor more than six months and, in addition to fine and imprisonment, may be sentenced to community service for not less than ten days nor more than six months.

License revoked for 12 months.

$150 service fee and attending an alcohol/drug education program for one year at defendants expense.

3 Third Offense

A fine of not less than $500 nor more than $1000 and imprisonment in the Urban County jail for not less than 30 days nor more than 12 months and may be sentenced to community labor for not less than 10 days nor more than 12 months.

License revoked for 24 months.

$150 service fee and attending an alcohol/drug abuse program for 1 year at defendant's expense.

4 Fourth or subsequent offense is a class D felony

Minimum term of imprisonment is 120 days, maximum 5 years.

Loss of license for 60 months.

Hardship License*

A person convicted of DUI may petition for a hardship license for the last 60 days of his suspension. Licenses may be granted if it is believed revocation would jeopardize the persons employment, education, medical care, substance abuse education programs or court ordered counseling. Person must provide court with proof of motor vehicle insurance, sworn statement from employer detailing hours and necessity of a motor vehicle, or a sworn statement from the educational institution of class schedule and necessity for using a motor vehicle to travel to and from institution.

*The court will not issue a hardship license to anyone who has refused to take an alcohol concentration or substance test.

Lexington-Fayette Urban County Accident Statistics

Over the past 10 years:

As a result of increased enforcement and driver awareness, fatalities have declined from approximately 40 per year to about 30, while DUI arrests have increased from 300 to about 2,500 annually.

Conviction rate for DUI is over 90% and BAC (blood alcohol concentration) average on DUI arrests has declined from .22% to .16%. Alcohol-related fatalities have declined from approximately 70% to less than 30%.

TrafficWatch

☆U.S. GOVERNMENT PRINTING OFFICE: 1995 - 615-000/20001

Appendix B - Driver Survey Questionnaire

We need your help in providing information about highway safety issues. Your answers will be used for statistical purposes only. Please do not write your name on this form.

1. Why are you at the driver's license office? (CIRCLE ONE)

   a. To get first license
   b. To renew currently valid license
   c. To have license reinstated
   d. To get an I.D. only
   e. other

2. Your sex? (CIRCLE ONE) a. Male b. Female

3. Your age? (CIRCLE ONE)

   a. under 18
   b. 18-20
   c. 21-24
   d. 25-29
   e. 30-49
   f. 50-65
   g. Over 65

4. What messages about enforcement of laws on drunken-driving, speeding, or not using a seatbelt have you heard, seen, or read in the last three months (on TV, radio, in the newspaper, posters, etc.)? Please, write in.

The message	Where seen, heard, or read
_____	_____
_____	_____
_____	_____

5. Have you noticed any increase in enforcement of any of the following traffic laws in the past three months? (CIRCLE ALL THAT APPLY)

   a. Drunk driving b. Speeding c. Not using a seatbelt

6. How often do you drink beer, wine or liquor? (CIRCLE ONE)

   a. Every day
   b. Several times a week
   c. Once a week
   d. Once a month
   e. Less than once a month
   f. Never

7. Within the last three months, how often do you think you may have driven after drinking too much? (CIRCLE ONE)

   a. Every day
   b. Several times a week
   c. Once a week
   d. Once a month
   e. Less than once a month
   f. Never

8. A. Compared with three months ago, are you *driving after drinking*: (CIRCLE ONE)

   a. More often? b. Less often? c. About the same? d. Do not drive after drinking

   B. If it changed, please say why:

   _____
   _____

9. A. Compared with three months ago, are you *speeding*: (CIRCLE ONE)

a. More often? b. Less often? c. About the same? d. Do not speed

B. If your speeding changed, please say why:

_____

_____

10. A. Compared with three months ago, are you *using your seatbelt*: (CIRCLE ONE)

a. More often? b. Less often? c. About the same? d. Always use seatbelt

B. If your seatbelt usage has changed, please say why:

_____

_____

11. Compared with three months ago, would you say that the chances of a *drunken driver* getting caught by the police have: (CIRCLE ONE)

a. Increased? b. Decreased? c. Stayed about the same?

12. Compared with three months ago, would you say that the chances of a *speeder* getting caught by the police have: (CIRCLE ONE)

a. Increased? b. Decreased? c. Stayed about the same?

13. Compared with three months ago, would you say that the chances of a *person not using a seatbelt* getting caught by the police have: (CIRCLE ONE)

a. Increased? b. Decreased? c. Stayed about the same?

14. Have you received a citation for a traffic law violation other than parking in Lexington-Fayette County during the last three months? (CIRCLE ONE)

a. Yes b. No

15. Did you receive any written material about why traffic laws are enforced in Lexington-Fayette County? (CIRCLE ONE)

a. Yes b. No

16. Do you support the vigorous enforcement of traffic laws? (CIRCLE ONE)

a. Yes b. No

Thank you for completing this survey.