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USE OF TELEPHONE SURVEYS TO DETERMINE AWARENESS OF TENNESSEE'S CHILD PASSENGER PROTECTION LAW

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16. Abstract

This report provides an analysis of the telephone surveys that were made in target areas throughout Tennessee to determine the levels of public awareness of Tennessee's child passenger protection law during a two-year time frame. This survey effort provided a basis for evaluating the effectiveness of two different promotional efforts--the basic state and comprehensive public information and education plans. In addition, the surveys measured the relative importance of sources of information and, therefore, the impact of each segment of the public information and education programs.

Chapter I discusses the importance of protecting child passengers in motor vehicles, describes the Tennessee child passenger protection law and outlines the objectives and goals of the Child Passenger Safety Program. Chapter II describes the research methodology, sample size and sample selection. Chapter III discusses the results of the telephone surveys. Chapter IV examines the relative importance of various sources of information as revealed by the surveys. Chapter V provides conclusions and recommendations based on the results of the study.

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METRIC CONVERSION FACTORS

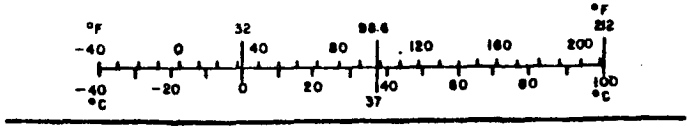
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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PREFACE

This report is one in a series of 11 reports on the Child Passenger Safety Program in Tennessee. These reports are:

1. The Tennessee Child Passenger Safety Program;
2. The Impact of a Child Passenger Restraint Law and a Public Information and Education Program on Child Passenger Safety in Tennessee;
3. Development of Materials and Public Relations Efforts to Promote Child Passenger Safety;
4. Use of Telephone Surveys to Determine Awareness of Tennessee's Child Passenger Protection Law;
5. Organizational Networks for Promoting Child Passenger Safety;
6. Judicial Perspectives on Child Passenger Protection Legislation;
7. Enforcement of the Child Passenger Protection Law;
8. Development of a Child Passenger Safety Component for Driver Education Programs;
9. Parents' Knowledge, Attitudes and Behavior About Child Passenger Safety;
10. Child Restraint Device Loaner Programs; and
11. Compliance with the Child Passenger Protection Law: Effects of a Loaner Program for Low-Income Mothers.

This report provides an analysis of the telephone surveys that were made in target areas throughout Tennessee to determine the levels of public awareness of Tennessee's child passenger protection law during a two-year time frame. This survey effort provided a basis for evaluating the effectiveness of two different promotional efforts--the basic state and comprehensive public information and education (PI&E) plans. In addition, the surveys measured the relative importance of sources of information and, therefore, the awareness impact of each segment of the PI&E programs.

In the test population, approximately 70 percent of the respondents claimed some awareness of the law. There were two PI&E plans--the comprehensive plan and the basic state plan. The study of public responses indicated that the comprehensive plan effort established significantly greater increases in awareness than did the basic state plan effort. The survey also revealed that the sustained comprehensive plan yielded higher levels of awareness than those levels obtained simply in the initial stage of the comprehensive plan.

The level of awareness for the targeted individuals--parents of children less than four years of age--tended to parallel those of the general population, although at higher rates. Approximately 90 percent of the target population reported an awareness of the law. Awareness of the law was very significantly related to child restraint device (CRD) ownership.

According to the study, the general public participating in the survey became aware of the child passenger protection law primarily through television announcements (40 percent of the general public learned of the law through television). Newspapers informed 27 percent, while conversations with friends and relatives informed 11 percent. Radio messages informed about 5 percent in urban areas and 12 percent in rural areas. Billboards had a negligible effect on levels of awareness, as did personal presentations to civic groups and the medical community or the circulation of printed materials (pamphlets and brochures).

On a longitudinal basis, the cumulative effect of PI&E on the targeted population was apparent, with parents of children under four years of age claiming almost twice as many sources of information as did others at the end of the two-year program. In general, the results indicate the importance of the long-term comprehensive program with respect to awareness, especially for the targeted group of parents.

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I. INTRODUCTION

Automobile accidents are the leading cause of death to children over one month of age. The National Highway Traffic Safety Administration reports that children in the birth to four-year-old group sustained 5,411 motor vehicle-related deaths and injuries in 1979. In Tennessee, 17 children under age five lost their lives in automobile accidents in 1978. During this same period, 1,000 injuries to small children in the state were reported by the Tennessee Department of Safety (1978).

It is believed that these reported cases underrepresent the actual number of children adversely affected by automobile accidents. Unrestrained children frequently are injured when the automobile stops suddenly, swerves or takes a sharp curve. Most parents are aware of the additional hazards of unrestrained children sticking their heads and hands out of automobile windows, opening car doors and distracting the driver. Furthermore, these dangers are compounded by the physical characteristics of young children. The head and upper torso of the young child are large and heavy in proportion to other parts of the body. This means that head and upper torso are likely to be the first parts of the body to strike objects when the child is thrown off balance.

Studies indicate that children who are unrestrained in passenger vehicles are more likely to be killed or injured in an accident than those who are restrained. A Washington state seat belt study indicated that if all children under the age of five years were restrained at the time of an accident, a reduction of deaths by 91 percent and of injuries by 78 percent might be expected (Scherz, 1974). However, seat belts used alone do not provide adequate protection for small children. Shelness & Charles (1975) document the need for small children to wear special CRDs. They discovered that seat belts (lap type) can slip on the child's abdomen and cause internal injury during a crash. They point out further that children (infants in particular), due to their proportionally short legs and large heavy heads, are far more likely than are adults to be thrown about in a vehicle upon collision.

An example of the ineffectiveness of seat belts for small children is demonstrated by the Australian experience. Since 1971, Australia has required the use of seat belts for all passengers in motor vehicles. During the period 1972 to 1974, a reported 25 percent reduction in fatalities and a 20 percent reduction in injuries in most categories occurred. However, statistics show no significant reduction in fatalities and injuries of small children during this period (Boughton, Lancashire & Johnston, 1977).

Although many parents are aware of these dangers and the additional risks to young children because of their anatomical development, relatively few parents take active measures to protect their children while traveling in automobiles. The Insurance Institute for Highway Safety reported that 93 percent of children under ten years of age ride as passengers in vehicles without any type of restraint (Williams, 1976). On the basis of an observational study of child passengers traveling to and from amusement areas and shopping centers in Maryland, Massachusetts and Virginia it is documented that, of the children under four years of age who were riding in CRDs, only 27 percent were properly restrained against death or injury (Williams, 1976).

Thus, even those who are aware of the benefits of using CRDs need education in their proper use.

Child Passenger Protection Legislation in Tennessee

In 1977, the Tennessee legislature passed legislation requiring parents or guardians to provide protection for children and infants under the age of four years while riding in a motor vehicle. The child passenger protection law specifically requires that the child or infant be restrained in a federally-approved CRD or be held in the arms of an older passenger (see Appendix A for legislation). Public health officers, legislators and the Tennessee Chapter of the American Academy of Pediatrics were instrumental in securing passage of the bill. Dr. Robert Sanders, Director of the Rutherford County Health Department in Murfreesboro, Tennessee, had served as a member of a state accident prevention task force and had begun efforts to introduce a child restraint bill as early as 1974.

On January 1, 1978, the law became effective, making Tennessee the first state in the nation to pass such legislation. There are six basic points to the law.

1. The law applies only to parents and legal guardians who are driving their own cars.

2. Only children under the age of four must be restrained.

3. The child can be held by an older passenger (the so-called "babes-in-arms" clause).

4. The CRD must be one that is federally approved.

5. The CRD must be used properly.

6. The law does not apply to recreational vehicles of the truck or van type or to trucks having a tonnage rating of one ton or more.

The Tennessee Child Passenger Safety Program

Since mere passage of the law did not ensure a reduction of deaths and injuries to Tennessee children, the Tennessee Governor's Highway Safety Program and the National Highway Traffic Safety Administration jointly sponsored the Child Passenger Safety Program. The broad goals of this program were (1) to publicize the law, (2) to educate the people of the state of Tennessee about the importance of CRDs and (3) to evaluate the effectiveness of these efforts and the overall impact of the legislation on reducing deaths and injuries to children under the age of four years involved in automobile accidents in Tennessee. The Child Passenger Safety Program began three months prior to January 1, 1978, to permit collection of baseline data on CRD usage. The program continued for a 36-month period. The Transportation Center of The University of Tennessee and the Tennessee Governor's Highway Safety Program worked jointly to accomplish the program's objectives and tasks.

Objectives of the Tennessee Child Passenger Safety Program

The project was divided into three major activity areas: (1) PI&E, (2) evaluation and (3) management. Sixteen specific objectives were identified; these are listed in Table 1. In order to accomplish these objectives, 34 specific tasks were developed (see Table 2) concerning topics such as enforcement, adjudication, child restraint systems, child passenger accident records, legislation, advertising, education and support of various groups and organizations. Objectives I-V related to the evaluation area of the project; Tasks 1-13 were developed to meet these objectives. Objectives VI-XV related to the PI&E component of the project; Tasks 14-33 were identified to satisfy these objectives. Management activities were encompassed by Objective XVI and Task 34. An effective integration of all these activities and tasks was pursued to ensure the greatest positive impact of the law.

In order to evaluate the effectiveness of the PI&E campaign in increasing CRD usage, it was necessary to determine how many parents and guardians used CRDs prior to January 1, 1978, when the law took effect and the PI&E activities began. A data collection plan was developed to obtain information on usage of CRDs before and after January 1, 1978. The data collection involved a complex procedure, with data collection intervals staggered throughout the duration of the program at six selected target areas. These areas included five major urban centers (Memphis, Nashville, Chattanooga, Knoxville and the Tri-Cities area) and one rural area (composed of merged data from Dyersburg, Columbia and Morristown). These areas are shown in Figure 1. The baseline data collected prior to January 1, 1978, provided information on the use of CRDs, the number of people using seat belts, demographic characteristics of the population surveyed and other information vital to the evaluation activities of the program.

The intent of the PI&E program was to determine effective educational efforts for increasing CRD usage rates and market segments with which they could be successful. The PI&E program consisted of two parts--the basic state plan (which included low profile statewide activities throughout the duration of the program) and the comprehensive plan (consisting of intensive promotional activities). The basic state plan required only the distribution of brochures and posters to hospitals, doctors' offices, clinics and other strategic places to which parents with small children may visit frequently. The comprehensive plan not only included the same activities, but also utilized television and radio public service announcements, outdoor advertising, displays and contact with special interest groups and driver education programs. Newspapers were encouraged to run editorials and feature stories and to cover events such as CRD related press conferences. A loaner program to help low-income families acquire CRDs supplemented the comprehensive plan in Memphis and Chattanooga. Comparisons of the impacts of the comprehensive PI&E plan with those of the basic PI&E plan were made.

Figure 2 shows the data collection and PI&E implementation schedule of the two plans in the various target areas. The initial data collection occurred prior to the effective date of the law and PI&E program. This data collection was taken to obtain baseline usage rate data. The samplings, taken every six months after the implementation of the law and PI&E program, were called semiannual surveys. The comprehensive plan was first implemented in Nashville. The implementation schedule shown in Figure 2 permitted a comparison of the impact of the basic state plan and the comprehensive plan.

TABLE 1

CHILD PASSENGER SAFETY PROGRAM OBJECTIVES

Objective	Description
I.	Determine the compliance with the enforcement of Tennessee's child passenger protection law.
II.	Determine the number of convictions for violation of the Tennessee child passenger protection law.
III.	Determine the attitude of adults toward and availability of CRDs.
IV.	Determine the number of deaths and injuries of children (under the age of four) resulting from being a passenger in an automobile involved in an accident.
V.	Determine the public awareness of the law and attitudes toward it.
VI.	Increase the usage of CRDs and encourage the enforcement of the Tennessee child passenger protection law through press coverage in newspapers across the state.
VII.	Promote an awareness of the child passenger protection law and increase proper usage of CRDs through television advertising.
VIII.	Increase public awareness of the child passenger protection law and encourage CRD usage through public service announcements on the radio.
IX.	Select an image slogan with emphasis on easy visual and audio identification to be used on all printed materials, radio and television.
X.	Promote proper use of CRDs and knowledge of the child passenger protection law through outdoor advertising.
XI.	Educate as many people as possible about the proper use of CRDs and the law by utilizing printed materials (posters, brochures, handouts, etc.).
XII.	Encourage the increased use of CRDs and provide knowledge of the child passenger protection law by utilizing audiovisual presentations.

TABLE 1 (continued)

Objective	Description
XIII.	Develop an awareness of the child passenger protection law and its implications in driver education classes in secondary public schools throughout the state by designing an instructional packet for class use.
XIV.	Provide CRDs for selected citizens who cannot afford them by making the national CRD manufacturers aware of the Tennessee child passenger protection law and encouraging each manufacturer to donate approximately 25 CRDs to local law enforcement agencies, civic groups, etc., across the state.
XV.	Develop and generate support and endorsement from organizations such as enforcement agencies, civic groups, pediatricians, hospitals, etc.
XVI.	Ensure that the project is managed in an effective and efficient manner.

TABLE 2

CHILD PASSENGER SAFETY PROGRAM TASKS

Task	Description
1.	Observational Survey of CRD Usage
2.	Survey of CRD Proper/Improper Use
3.	Survey of Number of Arrests
4.	Attitudinal Survey of Enforcement Agencies
5.	Survey of Number of Convictions
6.	Survey of Judges' Attitude Toward Law
7.	Survey of CRD Availability (Manufacturers, Wholesalers, Retailers)
8.	Attitudinal Survey of Owners of CRDs (Personal Interview)
9.	Attitudinal Survey of Owners of CRDs (Telephone Survey)
10.	Safety Agencies Survey of Accident Data
11.	Survey of Hospital Records
12.	Determination of Public Awareness (Personal Interview)
13.	Determination of Public Awareness (Telephone Survey)
14.	Newspaper Coverage
15.	Public Service Television Spots
16.	Television News Spots
17.	Radio News Spots
18.	Radio Feature Programs
19.	News Interviews with Project Participants

TABLE 2 (continued)

Task	Description
20.	Image/Slogan Selection
21.	Designing of Billboards
22.	Designing of Brochures and Posters
23.	Development and Reproduction of Audiovisual Presentations
24.	Instructional Packet for Driver Education Programs
25.	Establishment of a CRD Loaner System
26.	Identification of Sources of Endorsement and Support
27.	Exchange Information and Materials
28.	Communication with Tennessee Department of Safety
29.	Communication with the National Safety Council
30.	Provide Materials to Prenatal Groups
31.	Development of Portable Exhibit
32.	Department Store Advertisement
33.	System of Communication with CRD Manufacturers
34.	Management of Project

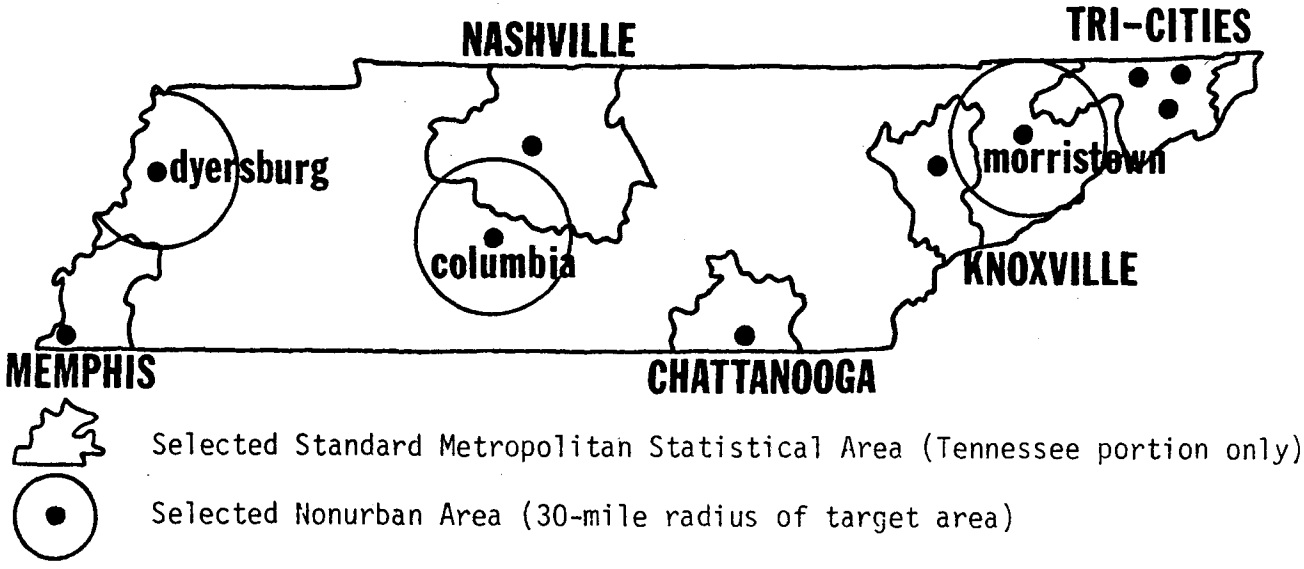

FIGURE 1

LOCATION OF TARGET AREAS FOR DATA COLLECTION

Target Area	Oct. 77	Jan. 78	July 78	Jan. 79	July 79	Jan. 80	July 80	Oct. 80
Memphis		BSP	CP + LP	CP + LP	CP + LP	CP + LP		Analysis and Report Preparation
	BLD	SAS	SAS	SAS	SAS			
Nashville		CP	CP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			
Knoxville		BSP	CP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			
Chattanooga		BSP	BSP	CP + LP	CP + LP	CP + LP		
	BLD	SAS	SAS	SAS	SAS			
Tri-Cities		BSP	BSP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			
Nonurban Dyersburg Columbia Morristown		BSP	BSP	CP	CP	CP		
	BLD	SAS	SAS	SAS	SAS			

Legend: BLD = Baseline Data
SAS = Semiannual Survey
BSP = Basic State Plan
CP = Comprehensive Plan (includes BSP)
LP = Loaner Program

FIGURE 2

DATA COLLECTION AND PUBLIC INFORMATION AND EDUCATION IMPLEMENTATION PLAN

In the study the number of target areas receiving the comprehensive plan (Figure 2) was to be increased each six-month interval until all target areas were included. A loaner program (Figure 2) designed to provide CRDs to selected citizens who could not afford them was implemented in Memphis beginning six months after the effective date of the law. Chattanooga received a loaner program six months after the Memphis loaner program was established. The objective of the loaner programs was to develop administrative procedures for establishing area-wide loaner programs rather than to attempt to reduce deaths and injuries. There were not a sufficient number of CRDs available through the loaner program to impact the death and injury rate.

Community Descriptors

Physical Environment. Tennessee is divided into 95 counties, grouped for geographic and cultural reasons into three regions--East, Middle and West. To facilitate planning and programming, the state consists of nine economic development districts.

Population. The population of Tennessee at the time of the 1970 census was about 3,926,018; the most recent estimate (1979) showed the population to be 4,380,000. Populations of the study areas are shown in Table 3.

Licensed Drivers and Registered Vehicles. In 1976, Tennessee had 2,532,672 drivers with valid licenses; in 1977, 2,611,558; in 1978, 2,696,652, and in 1979, 2,755,445. In 1976 there were a total of 3,420,097 motor vehicles registered in the state; in 1977 a total of 3,666,757 motor vehicles were registered; in 1978 this total increased to 3,799,193.

Special Factors. The 1970 census showed that there were 256,650 children in Tennessee in the under-four age group. The most recent estimate (1979) showed there were 325,966 children under four years of age in Tennessee. The accident files of the Tennessee Department of Safety indicate that in 1974, 702 children under four were injured in motor vehicle* accidents; 899 were injured in 1975; and 1,057 were injured in 1976. In 1977, 979 children under four were injured. After the child passenger protection law became effective in 1978, the numbers of injuries increased to 1,000 in 1978, then dropped to 874 in 1979. Data on injuries to children under one year of age were unknown. It is estimated that injuries for this category were approximately the same as the one year old category.

Objectives of the Telephone Surveys

The telephone surveys were designed to accomplish two main objectives. The first was to determine the levels of awareness of the law in the target areas at different time periods and to then use those results as a basis for evaluating the effectiveness of the basic state and comprehensive plans for PI&E. The second objective was to examine the relative influence of the various sources of information about the law in order to judge the effectiveness of each segment of the PI&E programs.

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*passenger vehicle only

TABLE 3

COMMUNITY DESCRIPTORS

Descriptors		1976	1977	1978
A.	Population			
	Tennessee	4,234,000	4,292,000	4,332,954
	Memphis	667,880	668,443	663,769
	Nashville	430,941	428,957	425,424
	Knoxville	185,649	184,942	185,236
	Chattanooga	162,077	165,280	162,778
	Tri-Cities	100,234	101,327	100,532
	Columbia	22,583	22,944	23,258
	Dyersburg	15,673	15,573	15,768
	Morristown	20,799	20,673	20,479
B.	Licensed Drivers	2,532,672	2,611,558	2,696,652
C.	Registered Vehicles	3,420,097	3,666,757	3,799,193
D.	Children Under Four Injured in Motor Vehicle Accidents	1,054	979	1,000

Each of these objectives can be subdivided and made more specific. The levels of awareness will be used primarily to compare:

1. The basic state and comprehensive PI&E plans within the same periods of time;

2. The results of progressing from the basic state plan to the comprehensive plan within the same target areas;

3. Urban and rural target areas in the same time period and under the same PI&E plan; and

4. Parents of children under four years of age versus other adults for each of a range of conditions.

Levels of awareness of the law will also be used to explore some secondary objectives, by providing contrasts of:

1. Daytime and nighttime sample results;

2. The standard and alternate telephone protocols; and

3. CRD owners and nonowners, using only parents of children under four years of age.

The relative importance of sources of information about the law and the relative frequency with which they are cited will be examined:

1. To establish which methods of communication are most effective in general;

2. To contrast the basic state and comprehensive PI&E plans, averaged across urban target areas;

3. To compare the urban and rural results;

4. To report on those sources where the observed levels of importance of information sources differ from what was expected;

5. To assess the appropriateness of the segments of the basic state and comprehensive PI&E plans;

6. To evaluate daytime versus nighttime differences in sources of information; and

7. To examine any disparity resulting from the use of two different telephone protocols.

It should be noted that statistical tests of hypotheses are applied only where sample sizes and independence considerations warrant. Many comparisons using subsamples are made using descriptive statistics only.

Summary

The Child Passenger Safety Program was created to publicize the child passenger protection law, to educate the people of Tennessee about the importance of CRDs, to evaluate these efforts and to evaluate overall impact of the child passenger protection law on reducing deaths and injuries to children. Specific objectives and tasks were developed among three activity areas: PI&E, evaluation and management.

This report provides an analysis of telephone surveys that were used during a two-year period to determine the levels of awareness of Tennessee's child passenger protection law in target areas throughout the state. This provided a basis for evaluating the effectiveness of the two promotional efforts. In addition, the surveys measured the relative importance of the various sources of information and, therefore, the awareness impact of each segment of the PI&E programs.

Chapter II of this report describes the research methodology used to determine the levels of awareness of the child passenger protection law throughout the state and provides information on the sample size and the sample selection process. Chapter III discusses the results of the telephone survey among two different groups of the population, contrasting the effectiveness of the two PI&E campaigns within the same time period and denoting the changes in awareness over a longer period of time. The relative importance of the various sources of information about the law and the relative frequency with which they were cited is examined in Chapter IV. Chapter V provides conclusions and recommendations based on the results of the study.

II. RESEARCH PLAN

Background

The telephone survey was selected as the tool to establish the levels of awareness of the law and to determine the relative influence of the various sources of information. Telephone surveys satisfied the need to provide relatively accurate and rapid feedback to the PI&E planners at a moderate cost. In 1975, 93 percent of U.S. households had telephones (Horton & Duncan, 1978), so a telephone sample survey has the potential for being representative. However, a number of other points had to be considered to establish the utility and the limitations of the telephone survey as a research tool.

One problem with using the telephone to obtain a representative sample from the population has been the high percentage of households with unlisted phones, whether by choice or because of mobility. Brunner & Brunner (1971) and Glasser & Metzger (1975) found differences between listed and unlisted customers. However, in a more recent study, Rich (1977) reported only 5 percent of the population with unlisted numbers, with no differences between samples taken from a telephone directory and a sample including the unpublished numbers. Random digit dialing has helped to eliminate the biases of unpublished numbers but is a more costly approach (Glasser & Metzger, 1972; Landon & Banks, 1977). Sudman (1973) suggested a combination of random-digit dialing and sampling from directories and other personal listings as a means of obtaining the most accurate sample at a reasonable cost. Researchers have investigated other variables in telephone surveying, including variations in question format (Locander & Burton, 1976) and respondent cooperation at different times during the day and week (Falthzik, 1972). Schiedeskamp (1962) attempted to measure the validity of phone responses by reinterviewing his sample a year later and found no differences in the two sets of data. Horton & Duncan (1978) concluded that the disadvantages of using the telephone as a survey tool have been overcome and have recommended that it be recognized as a viable method of collecting data.

Some researchers have attempted to compare different survey methods. No conclusive evidence has been found in the comparison of self-report and observation. Fháner & Hane (1974) found no differences between observed and self-reported seat belt usage in a study of 257 Swedish drivers. On the other hand, Waller & Barry (1969) reported that the claimed use of safety belts was an invalid measure of actual use.

Hochstim (1963) studied the difference between mail, phone and personal methods of data collection. Generally, he found that these three methods produced similar results, although more face-saving answers (e.g., frequency of drinking) were given when the respondent was confronted by interviewers.

The difference between data collected by phone and by personal interview has been studied extensively. In an early study regarding Civil Defense procedures, Larsen (1952) found people were more prone to lie on the phone than in person. Oakes (1954) found students offered more suggestions for the improvement of the food service when asked in person versus on the

phone. However, by far the largest number of results are consistent with the conclusion that no differences exist between phone and personal interviewing (Cahalan, 1960; Colombotos, 1969; Pirot, Pennen & Rosenblood, 1976; Rogers, 1976). Interviews by telephone are regarded as satisfactory, efficient and economical for a wide range of survey purposes (Feber, 1974).

To save time and money, it was decided to implement the telephone surveys without random digit dialing, but the telephone survey results would be interpreted cautiously, with the understanding that they could contain some small biases due to the practical limitations of the methodology. The most important of these limitations appears to be the tendency of respondents to give face-saving or socially acceptable responses. This means, for this study, that the awareness rates measured are probably inflated. However, the changes in awareness rates are essentially free of such biases; thus the important contrasts can be examined as planned.

Design Contrasts Available

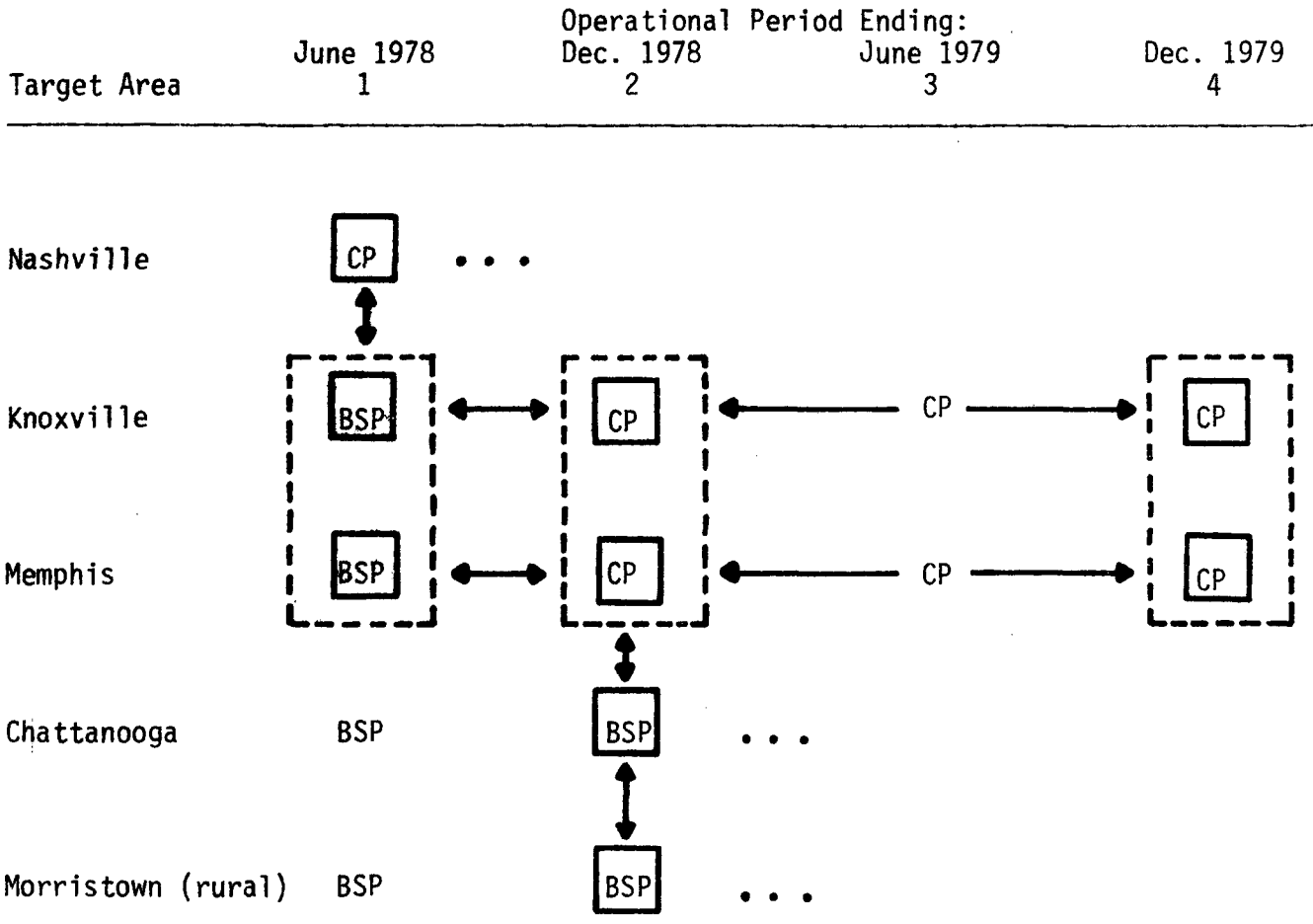
The general outline of the survey design is most easily understood by looking at Figure 3. There it can be seen that the contrast of the awareness levels engendered by the basic and comprehensive PI&E plans in urban areas can be examined within period 1 (Knoxville and Memphis versus Nashville) and again within period 2 (Chattanooga versus Knoxville and Memphis). An urban versus rural contrast is available in period 2 (Chattanooga versus Morristown), when both sites have been under the basic state plan. A longitudinal contrast of the basic and comprehensive PI&E plans is available by using Knoxville results, then Memphis results, and finally the combined data of the two cities (period 1 versus period 2 in all cases). Next, early stages of the comprehensive PI&E plan can be compared with a stage one year later by using Knoxville, then Memphis, then both target areas combined (period 2 versus period 4). This will permit a test of the hypothesis that there is a change in awareness (increase or decrease) in the face of a continuing PI&E campaign.

The above comparisons were designed for the survey of the general population, but similar comparisons can be made for subgroups. For example, parents of children under four years of age are of interest, and their responses will be reported.

In addition, the sources of information about the law were obtained from those respondents who indicated an awareness of the child passenger protection law. These sources were broken down into mass media components (television, newspaper, radio, billboards), word-of-mouth components (clubs, organizations, doctors and hospitals, friends and relatives, schools, work) and print media components (pamphlets or brochures). In some cases, the mass media components were further subdivided (e.g., news/public service announcements/talk shows/other).

Sample Size Requirements

In order to compute the sample size requirements for testing differences between the awareness levels of different surveys (a test of proportions), the formula in Appendix B was applied. To make it operational, a number of parameter values had to be chosen. First, the desired confidence $(1 - \alpha)$ in



Notes: A box indicates a telephone survey taken at the end of that period.

The type of promotional plan prior to the survey is indicated in each box: BSP = Basic State Plan; CP = Comprehensive Plan.

The double arrows indicated comparisons to be made.

FIGURE 3

TELEPHONE SURVEY PLAN

a decision that the levels are significantly different needed to be specified. Similarly, the requisite confidence ($1 - \beta$) in a decision that the levels are the same had to be preselected. Ninety percent confidence levels were chosen for both $1 - \alpha$ and $1 - \beta$ in this sample size analysis.

The expected levels of awareness, p_1 and p_2 (and their counterparts q_1 and q_2), did not need to be chosen since the conservative value of 50 percent was chosen for each.

The most critical parameter to choose was the size of the difference that it is important to detect, and the difference between the basic state and comprehensive plans was the most important one to consider. The comprehensive plan was expected to have a major impact on the general level of awareness, whereas the basic state plan did not make use of mass media but rather was a focused campaign directed at parents of children under four years of age and only affecting the rest of the population incidentally. As a consequence, fairly large differences in the levels of awareness were anticipated between the two plans, on the order of 10 to 15 percent.

To be 90 percent confident of detecting a difference in levels of awareness of 11.5 percent would require a sample of about 250 on each survey. As a conservative measure, it was decided to set $n = 260$ as the minimum acceptable sample size for any one survey. The actual sample sizes are shown in Table 4. It can be seen that many sample sizes are substantially above the minimum. Table 4 also summarizes the target areas involved in this study and the dates and operational periods of the surveys.

Sampling Procedure

Systematic random samples were taken from current telephone directories in each target area surveyed. A description of the process and the most recent instructions for the survey (Appendix C) will serve to outline the process.

Knowledge of the required sample size, together with the total number of telephone numbers available, determined k such that every kth number could be selected. In practice, k was chosen to meet the minimum sample size requirements with a margin for error. In addition, for every primary number an alternate was chosen on the same page. The alternate numbers were used when no responses were obtained at the primary numbers.

The personnel placing the survey calls were instructed to be polite, professional and to the point. The instructions listed in Appendix C indicate that an effort was made to deal with all aspects of the sample on a systematic basis; e.g., "Let the phone ring six times." In addition, each caller followed the same telephone protocol in the process of obtaining information from the sample participants (Appendix D). The original form is shown. The phrasing of the questions is appropriate for samples taken in 1978. For samples taken in 1979, Questions 2 and 2b were rephrased. That is, instead of referring to "the law which was effective the 1st of this year" for Question 1, the phrasing became "Have you heard about the law which became effective January 1, 1978?" Similarly, for Question 2b the original question, "Did you

TABLE 4

SITES, DATES, AND SAMPLE SIZES OF SURVEYS

Target Areas*	Dates of Surveys	Toward End of	Sample Sizes
Nashville	April 27-28, 1978	Period 1	282
Knoxville**	April 30-May 1, 1978	Period 1	265
	December 6-11, 1978	Period 2	277
	January 24-25, 1980	Period 4	281
Memphis	August 17-18, 1978	Period 1	297
	January 15-18, 1979	Period 2	327
	January 24-25, 1980	Period 4	268
Chattanooga	December 4-7, 1978	Period 2	279
Morristown (rural)	December 13-14, 1978	Period 2	262

*No telephone surveys were conducted in the Tri-Cities area or the rural sites of Dyersburg and Columbia.

**An additional survey was made in Knoxville, December 6-11, 1978, using an alternate telephone protocol (N = 279).

get (the CRD) since January of this year?," was changed to, "Did you get it since January 1, 1978?"

In addition, a major variation of this form was used at the end of the second operational period in a control study in Knoxville. Parallel studies were conducted, one using the standard form, the other using the alternate form (Appendix E) which did not key the respondent about the existence of the law. The standard protocol results served as the regular component of the survey; the alternate protocol results provided a basis for estimating the inflation rate due to face-saving responses.

One additional precaution was taken in the administration of the surveys. Roughly one-half of each sample taken on any given survey was obtained during the regular working hours of the day (9:00 a.m. to 5:00 p.m.), with the other half being obtained in the evening (6:00 p.m. to 9:00 p.m.). This permitted a contrast of the results for these two sampling times so that any significant bias could be revealed.

III. LEVELS OF AWARENESS

General

There are three measures of the effectiveness of a PI&E program--awareness, attitude and behavior. Since CRD use involves both expense and inconvenience, the behavior measure, the CRD usage rate (which plateaued above 20 percent), was expected to be the lowest of the three. A larger proportion of the affected parent population was expected to have a positive attitude toward the law. And, finally, awareness of the law requiring the protection of child passengers under four years of age was expected to be higher still, both for affected parents and the population in general. This proved to be an accurate assessment.

As can be seen from Table 5, the percent of the sampled adult population indicating awareness of the law is quite high. On the average across all nine telephone surveys, almost 70 percent of the total sample claimed some degree of awareness.

When attention is restricted to the subgroup consisting of parents of children under four years of age, which represents 13 percent of the total sample, the average awareness level is almost 90 percent of those surveyed. Moreover, if the results of the individual surveys are examined in Table 6, it is apparent that affected parents are more aware of the law than the general population in every survey conducted.

In sum, it appears that the combination of the standard news reportage plus the additional components due to the two PI&E campaigns was quite effective.

Contrasts Within Time Periods: General Population

The effectiveness of the two PI&E campaigns can be contrasted within the first and the second operational periods using values taken from Table 5. In the first period, the basic state plan is represented by the combined Knoxville and Memphis data. The pooled awareness level is 62.3 percent. This is compared to Nashville's awareness level of 77.3 percent attained after six months of the comprehensive plan. The awareness of the law is significantly higher in the comprehensive plan target area, at the .05 level of significance.

In the second period, considering urban areas only, the combined Knoxville and Memphis awareness rate of 71.2 percent followed approximately six months of the comprehensive plan, while the continuing basic state plan in Chattanooga resulted in an awareness rate of 52.3 percent. Again, the awareness of the law is significantly higher in the comprehensive plan target area, at the .05 level of significance.

An urban-rural contrast was expected in period 2, with Chattanooga compared to Morristown, while both were ostensibly receiving the basic state plan. It was anticipated that urban awareness would be higher than rural awareness. The results indicate that the Morristown awareness levels were significantly higher than those of Chattanooga. The explanation lies in the

TABLE 5

LEVEL OF AWARENESS
SUMMARIZED BY SAMPLES AND PI&E PLANS

Samples	Average Across 9 Surveys (%)	Basic PI&E Plan: Average of 3 Urban Surveys (%)	Comprehensive PI&E Plan: Average of 5 Urban Surveys (%)
General Population	69.0	58.9	75.4
Parents of Children < 4	89.2	80.8	92.9

TABLE 6

LEVELS OF AWARENESS BY TARGET AREA AND PERIOD
FOR SAMPLES FROM THE GENERAL POPULATION
(AND PARENTS OF CHILDREN UNDER FOUR YEARS OF AGE)

	Operational Period (percent aware)			
Target Area	1	2	---	4
Nashville	77.3 (93.1)			
Knoxville	61.5 (84.2)	69.7 (97.4)	--- ---	81.1 (86.2)
Memphis	63.0 (86.7)	72.5 (87.8)	--- ---	76.5 (100.0)
Chattanooga		52.3 (71.4)		
Morristown (rural)		67.2 (95.8)		

fact that there was a confounding with PI&E plans. Chattanooga had the basic state plan nearly as designed. However, it was discovered that Morristown was receiving Knoxville's television broadcasts as well as prematurely released radio public service announcements and was getting, in part, the comprehensive plan. If Morristown is considered to be in a comprehensive plan area and contrasted with the combined urban results for Memphis and Knoxville, then the urban areas show significantly higher levels of awareness. In view of the inadvertent confounding and the conflicting results, the urban-rural contrast must be disregarded.

Contrasts Within Time Periods: Parents of Children Under Four

The conclusions for this subsample must necessarily be more restricted since the sample sizes were substantially smaller, representing 13 percent of the total sample on the average. Nonetheless, it can be seen from Table 5 that there are strong parallels with the results for the general population. Within both the first and second periods, the urban target areas receiving the comprehensive plan had higher awareness rates than those receiving just the basic state plan. However, statistical significance at the .05 level is achieved only for the second period results. Results for the first time period are not significant.

The urban-rural contrast results (Morristown versus Chattanooga in period 2) for the subsample should be disregarded, because of the confounding with PI&E plans as previously discussed.

Changes in Awareness Levels Over Time: General Population

Using Table 6, a contrast of the PI&E plans across time periods 1 and 2 can be made for both Memphis and Knoxville, two target areas at opposite ends of the state. For Knoxville, the comprehensive plan yielded an awareness level of 69.7 percent in period 2, which is significantly higher than the period 1 rate of 61.5 percent obtained by the basic state plan, at an α level of .05. Similar differences were found in Memphis, with period 1 and 2 rates of 63.0 percent and 72.5 percent, respectively.

The growth of the awareness level in time under the comprehensive plan can be examined by contrasting periods 2 and 4 for both Knoxville and Memphis. For Knoxville the results are:

at end of 1979:	81.1%	aware
at end of 1978:	69.7%	aware
difference	11.4	(significant at α = .05)

For Memphis the data are:

at end of 1979:	76.5%	aware
at end of 1978:	72.5%	aware
difference	4.0	(not significant)

Combining the Memphis and Knoxville data, the pooled results are:

at end of 1979:	78.9%	aware
at end of 1978:	71.2%	aware
difference	7.7	(significant at α = .05)

In general, there is a small but significant growth in awareness of the law over time, although in Memphis the increase fell just short of significance. The more important fact is that the high initial awareness levels were sustained by the comprehensive plan programs. This corresponds to the CRD usage rate data for urban areas, where usage rates of approximately 20 percent were attained after the introduction of the comprehensive plan and were generally sustained or increased with time.

Changes in Awareness Levels Over Time: Parents of Children Under Four

Focusing on parents of children under four years of age and looking across time periods 1 and 2, for Memphis and Knoxville in turn, it can again be seen from Table 6 that the comprehensive plan outperforms the basic state plan in each case. However, the results for Memphis are marginal and not significant. The results for Knoxville are significant at $\alpha = .10$.

The changes in the awareness levels of affected parents across time periods 2 and 4, both under the comprehensive plan, are mixed. For Knoxville, there is a significant decline, while Memphis shows a significant increase in awareness, at the .10 α-level. This probably reflects the aberrations that can be observed in small samples, particularly for Knoxville where the subsample results contradict the large sample results.

Other Contrasts

One simple contrast that can be made is to compare daytime versus nighttime sampling. This is a well balanced design, since nearly equal samples were obtained at each time for each survey. As a consequence, the results were pooled across all nine surveys. The results are presented in Table 7. It can be seen that there is a slightly larger positive awareness rate obtained in the nighttime portion of the surveys as compared to the daytime portion. While the differences are not significant, they are systematic, and it can be conjectured that the nighttime respondent groups included more people who work outside the home and are either better informed or more prone to give the socially acceptable response. While it is appropriate to be aware of potential biases such as these, it should be clear that, because of the balance in the survey design, none of the contrasts previously reported would need to be reexamined, even if these differences had been significant.

The telephone surveys for comparing the standard and alternate protocols were accomplished with a full sample being obtained for each form. The data were taken under essentially identical conditions at the end of operational period 2 in Knoxville, following approximately six months of the comprehensive plan. The standard form was expected to result in inflated awareness levels because the question keyed the respondents to the existence of the law. The alternate form, on the other hand, could result in deflated awareness rates in view of the lack of focus in the question, "Are you aware of any requirements for children under 4 years of age to be restrained while riding in a car?"

The results are seen in Table 8, where it is apparent that the standard form yields higher awareness rates than does the alternate form. For the

TABLE 7

LEVELS OF AWARENESS FOR
DAYTIME VERSUS NIGHTTIME SURVEYS

Sample	Percent Aware	
	Daytime	Nighttime
General Population	68.2 (n = 1241)	69.9 (n = 1297)
Parents of Children < 4	88.1 (n = 166)	90.4 (n = 168)

Note: Results pooled across all nine surveys.

TABLE 8

COMPARISON OF TELEPHONE PROTOCOLS FOR KNOXVILLE
(COMPREHENSIVE PLAN, PERIOD 2, DECEMBER 1978)

Samples	Levels of Awareness for Protocols (%)		
	Standard Using Phrase " ... new State law ..."	Alternate: Using Phrase " ... aware of any requirements ... "	Maximum* Inflation of Standard Form Results
General Population	69.7 (n = 277)	51.3 (n = 279)	26.4
Parents Of Children Less Than 4	97.4 (n = 38)	74.4 (n = 39)	23.6

*Maximum Inflation = $\left(\frac{\text{standard form \% - alternate form \%}}{\text{standard form \%}}\right) \times 100.$

general population the figures are 69.7 percent and 51.3 percent, respectively. For the subpopulation consisting of parents of children under four years of age, the rates are 97.4 percent and 74.4 percent, respectively. If it is assumed that the alternate protocol is unbiased, then roughly one in four of the positive responses are attributed to keying or the eliciting of face-saving answers. If the alternate form underestimates the awareness levels, the inflation rate probably lies somewhere between 15 and 25 percent, or closer to one in five.

Contrasts of awareness levels are relatively unaffected by inflated figures. However, the overall levels of awareness can be reexamined under the assumptions that one in five of the positive responses represents the inflation effect. The awareness level for the sample from the general population was reported as 69.0 percent in Table 5. When discounted by 20 percent, it is still over 55 percent. The subset consisting of parents of children under four years of age had a measured average awareness level of 89.2 percent; discounting by 20 percent yields a figure over 70 percent. In sum, the results are still quite respectable after having been reduced for keyed or face-saving responses.

Continuing to focus on parents of children under four years of age, a major point of interest is the relationship between self-reports of awareness of the law and CRD ownership, pooled across all surveys. These results are shown in Table 9, which provides dramatic evidence that self-reports of awareness of the law are associated positively with self-reports of CRD ownership. Should the most positive figure be discounted 20 percent (from 75.7 percent to 60.6 percent), the results are still significant at the .05 level of significance, so that it appears the strength of the relationship is more than an artifact of self-reporting.

TABLE 9

RELATIONSHIP BETWEEN AWARENESS AND CRD OWNERSHIP FOR PARENTS OF CHILDREN UNDER FOUR

		Percent CRD Owners (by rows)		
		Yes	No	n
Aware of Law	Yes	75.7	24.3	288
	No	34.1	65.9	44
Overall		70.2	29.8	332

Note: Data pooled across all nine surveys.

IV. SOURCES OF INFORMATION

General

The framework for the dissemination of information about the child passenger protection law should be kept in mind as the sources of information are reviewed. First, there were many mass media news reports on the topic at the time of the passage of the law and at its inception, covering late 1977 and early 1978. Because of interest in the law, there were then a number of smaller news reports on children involved in accidents with respect to their use or nonuse of a CRD, plus a number of feature articles in newspapers on the subject of CRDs. Other city, state and federal agencies spread the word through their own channels of communication. These activities were in addition to the basic PI&E program as formally defined, but were a definite part of the comprehensive program, which promoted and encouraged mass media reports at every opportunity. In a sense then, the passage of the law generated its own, albeit temporary, PI&E program, and the formal PI&E programs were designed to sustain and enhance the distribution of information and education with respect to the law and CRD use.

Since there were a large number of sources for information, as seen on the standard telephone protocol (Appendix D), the responses were much more fragmented than those that simply measured levels of awareness. Further, the differences between the effects of the basic state and the comprehensive plans have already been established using levels of awareness. As a consequence, three major groupings of the source of information data were established. The first group consists of the Morristown survey alone because it is uniquely rural and also because it received a unique PI&E program, primarily basic with a comprehensive component. The second group consists of the three surveys of urban target areas taken after their receiving the basic state plan. The third group is made up of the five remaining surveys taken in urban target areas after those areas had received the comprehensive plan.

As a final note, a reminder of the nature of the data is appropriate. First, only those who indicated an awareness of the law gave citations as to the source(s) of their information. Second, each respondent was allowed multiple responses. The number of citations may then be less than, equal to, or greater than the survey sample size. Thus raw frequencies of citations are not interpretable, and the data of each survey must be indexed according to the perspective that needs to be examined. Furthermore, because of the multiple responses, statistical independence is not achieved and standard tests of hypotheses are inappropriate.

Relative Importance of Sources

Within a given survey the measure of relative importance of a source of information is defined simply as the ratio of the number of citations for that source to the total number of citations in that survey (x 100). The group average of the resulting indices for a source is a "percent of citations" attributable to that source. The measures of relative importance of sources of information for each of the three defined groups are found in Table 10.

TABLE 10

RELATIVE IMPORTANCE OF SOURCES OF INFORMATION FOR THREE GROUPS

Type	Source		Percent of Total Citations+ Rural Basic State Plan* (Morristown Only)	Urban Basic State Plan 3 Survey Average	Urban Comp. Plan 5 Survey Average
Mass Media	TV	News	34.4	31.2	24.1
		PSA	4.3	3.1	11.5
		Talk Show	-	1.1	1.5
		Unspecified	0.5	4.1	8.1
		(Total-TV)	(39.2)	(39.5)	(45.2)
	Newspaper	Article	26.3	21.3	13.6
		Ad	-	0.4	1.0
		Unspecified	2.4	6.1	11.4
		(Total-Newspaper)	(28.7)	(27.8)	(26.0)
	Radio		12.4	4.7	6.2
	Billboard		0.5	1.1	0.9
Word of Mouth	Friend or Relative		10.5	12.2	10.9
	Work or School		0.5	5.2	2.7
	Club or Organization		-	0.2	0.3
	Doctor/Hospital-Verbal		1.5	3.9	1.7
	(Total-Word of Mouth)		(12.5)	(21.5)	(15.6)
Print Other	Pamphlet or Brochure		1.0	0.4	0.6
	Unspecified		5.7	5.2	5.6
			100.0	100.2**	100.1**

*Basic plan plus a comprehensive component.

**Due to rounding error.

+Percent of total citations (by target area) $= \frac{\text{number of citations for a source}}{\text{total number of citations}} \times 100.$

Note that the sources of information about the law are condensed and regrouped for clarity in Table 10. It should also be kept in mind that the comprehensive PI&E program increased levels of awareness, but the relative importance figures in Table 10, because they must sum to 100 percent, cannot reflect any such increase.

The figures in Table 10 reveal that TV is the dominant source of information, accounting for 39 percent to 45 percent of the citations. Newspapers are next, accounting for about 27 percent of the citations on the average. Friends and relatives are third in importance, representing roughly 11 percent of the citations, while radio, a mass media source, is a close fourth, getting about 5 percent of the citations in the urban areas, but accounting for 12 percent of those in the rural sample. Other sources are negligible in importance.

When focusing on the contrast of Morristown versus the urban three-survey average, there are three features of this rural/urban comparison that bear mentioning. First, rural residents, when they remembered a source, tended to be more specific than their urban counterparts. Thus the rural citations of TV as a source included only one-half of one percent in the unspecified category, compared to 4.1 percent for the urban citations. A similar pattern can be seen in the newspaper citations, where the unspecified figures are 2.4 percent for the rural citations and 6.1 percent for the urban citations. This corresponds to the subjective experience of telephone interviewers, who reported that the rural sample tended to be more open and, in some cases, garrulous.

Secondly, the rural sample indicates a much larger reliance on radio as a source of information (12.4 percent) than does the urban sample (4.7 percent). This is consistent with the fact that the large number of radio stations in an urban area results in market segmentation, with the net result that it is difficult to reach an entire urban community by radio. On the other hand it is common to find just one radio station serving a rural community, and so its general population is within reach of a radio-based campaign.

Finally, it should be noted that person-to-person exchange of information is more important among urban respondents than rural respondents. Work, school, friends, relatives, clubs, organizations, doctors and hospital personnel all form the word-of-mouth network. The urban respondents list these sources for 21.5 percent of their citations, compared to 12.5 percent for rural respondents. This probably reflects a difference in opportunity to communicate, given the rural willingness to communicate reported earlier.

Table 10 is also used to contrast the two PI&E plans across urban target areas. It can be seen that the comprehensive plan had relatively less reliance on TV news, but a much higher proportion attributed to TV public service announcements and overall a higher percentage of TV citations. This reflects the impact of the comprehensive plan, where TV public service announcements were utilized with apparent good effect.

Newspapers showed a slight decline overall in relative importance, but more importantly, the nature of the citations changed. There tended to be more hard-news items during the earlier periods where the basic state plan

was in effect, whereas in later periods, when the comprehensive plan was implemented, the newspaper references tended to be more background information or feature items. This is apparently reflected in the fact that the basic state plan has 21.3 percent of its citations for newspaper articles versus only 13.6 percent under the comprehensive plan. This is counterbalanced in large part by an increase in the percent of unspecified newspaper citations, from 6.1 percent to 11.4 percent, perhaps attributable to the nature of the newspaper articles.

Radio shows a slight increase in relative importance when basic state and comprehensive plans are compared (4.7 percent versus 6.2 percent). The increase is small, however, and probably negligible.

Word-of-mouth sources show a decline in relative importance when the comprehensive plan is put into effect. Under the basic state plan, these sources accounted for 21.5 percent; under the comprehensive plan, with its emphasis on mass media, the figure is 15.6 percent. It will be shown that word-of-mouth sources were actually cited slightly more often under the comprehensive plan, so it should be emphasized again that the decline is in the relative importance of this source.

It can also be seen in Table 10 that, in general, the relative effectiveness of the billboard campaign was negligible for both types of PI&E campaigns. Part of this result is attributable to the unwillingness of billboard firms to display public service announcements in a time of high economic activity. As a consequence, there were some low billboard exposure rates in some target areas. However, even when examining specific target areas with good billboard coverage, the relative importance of billboards as a source of information is low. For example, the highest percentage observed at any specific target area was for Knoxville, which, in period 2 with the comprehensive plan, had over 30 billboards promoting CRD use and had a reported 3.6 percentage of awareness attributable to billboards. This does not represent a substantial contribution to the PI&E campaign.

Two other sources, civic organizations and the medical community, which are members of the word-of-mouth group, bear separate scrutiny. As part of the comprehensive plan, the Child Passenger Safety Program staff spent a great deal of time and effort giving talks and showing films to various clubs and organizations, including some of the largest civic groups in each target area. There is no apparent difference when the citation rates for the basic state and comprehensive plans are compared (0.2 percent versus 0.3 percent). This does not invalidate the importance of such groups, but merely suggests that the direct payoffs are negligible. For example, word-of-mouth sources of information proved important primarily because of friends or relatives, but this might be a reflection of linkage with medical community sources.

The other apparently disappointing word-of-mouth information source was the medical community--doctors and hospital personnel. The Child Passenger Safety Program personnel invested a disproportionate share of time cultivating and encouraging this group. Even more effort was expended by a few concerned members of that same medical community. It can be seen that the results for the general population, although not negligible, are not substantive. Again, it should be kept in mind that the importance of a group is not

necessarily related to its importance as an information source. It should also be remembered that the medical community directed its effort toward parents of children under four years of age, and this subgroup constituted only 13 percent of the sample.

A similar defense can be applied to the results when pamphlets and brochures are examined as sources of information. It is clear that the relative percentages are negligible. However, these materials were distributed primarily through doctors' offices, hospitals, public health centers and other medical facilities and were targeted toward a specific group rather than the general population. Thus the apparent low rates may belie an effective program, but the cost/benefit ratio needs to be examined more carefully.

Relative Frequency of Citation of Sources

Since raw frequencies are uninterpretable, indices of relative frequency of citation of sources of information were created. For any given survey, the measure of relative frequency of citation of a source is the ratio of the number of citations for a particular source divided by the total sample size for that survey (x 100). The average of the resulting indices for a source (across the surveys in a group) is that group's "index of citation frequency," attributable to that source. The indices of citation frequency for the various sources of information for each of the three defined groups are found in Table 11.

It can be seen from the overall citation index that frequency of citation is a function of PI&E plan; i.e., lowest is the three urban survey the average under the basic state plan; second is Morristown with its basic state comprehensive plan combination; and highest is the five urban survey average under the comprehensive plan. Because television is the major source of information, the fact that the indices for "Total-TV" progress in the same fashion is to be expected. In general, the figures of Table 11 conform to the results reported in Table 10.

Indices of citation frequency can also be used in a more specific comparison, that is, to compare subsamples obtained by partitioning the surveys into two dichotomous groups. These two groups are parents of children under four years of age and others. Their indices of citation frequency, by period, are shown in Table 12 for Knoxville and Memphis taken separately. These indices reveal that, as would be expected, the index of citation frequency is higher among affected parents than others in the population. This compares well with the results for levels of awareness. For Memphis the data also show a small decline for both affected parents and others in period 2, but a recovery in period 4. Overall, the most interesting point is that in period 4 there is a substantial increase in the index, particularly for parents of children under four years of age. This will be investigated further in the next section.

As a followup analysis to the comparison of daytime versus nighttime surveys, the indices of citation frequency, by source, are presented in Table 13. It is clear from the table that the differences are essentially minor, yet systematic, and tend to affect the full range of sources of information. Major sources of mass media (TV, newspaper) tend to be slightly more important in the daytime sample while all other sources tend to be slightly more important in the nighttime group.

TABLE 11

RELATIVE FREQUENCY OF CITATIONS FOR SOURCES OF INFORMATION FOR THREE GROUPS

Type	Source		Indices of Citation Frequency* Rural Basic Plan (Morristown Only)	Urban Basic Plan 3 Survey Average	Urban Comp. Plan 5 Survey Average
Mass Media	TV	News	27.5	23.2	26.2
		PSA	3.4	2.4	12.2
		Talk Show	-	1.0	1.7
		Unspecified	-	3.6	8.9
		(Total-TV)	(31.3)	(30.2)	(49.0)
	Newspaper	Article	21.0	17.2	14.6
		Ad	-	0.4	0.9
		Unspecified	1.9	5.3	13.1
		(Total-Newspaper)	(22.9)	(22.9)	(28.6)
	Radio		9.9	4.0	6.9
	Billboard		0.4	0.7	0.8
Word of Mouth	Friend or Relative		8.4	9.0	12.7
	Work or School		0.4	3.3	2.9
	Club or Organization		-	0.1	0.4
	Doctor/Hospital-Verbal		1.1	0.5	1.7
	(Total-Word of Mouth)		(9.9)	(12.9)	(17.7)
Print Other	Pamphlet or Brochure		0.8	2.1	0.7
	Unspecified		4.6	4.6	6.5
	Overall Citation Index		79.8	77.4	110.1

*Index of citation frequency (by target area) $= \frac{\text{number of citations for a source}}{\text{total number of respondents}} \times 100.$

TABLE 12

LONGITUDINAL COMPARISON USING INDICES OF CITATION FREQUENCY PARENTS OF CHILDREN UNDER FOUR YEARS OF AGE VERSUS OTHERS FOR KNOXVILLE AND MEMPHIS

Target Area	Groups	Indices of Citation Frequency* Period 1 BSP	2 CP	3 -	4 CP
Knoxville	Parents of children < 4	121.1	127.0	-	175.9
	Others	84.6	85.4	-	136.1
Memphis	Parents of children < 4	122.2	97.6	-	186.7
	Others	85.7	78.0	-	101.3

*Index of citation frequency (by period) $= \frac{\text{number of citations for a group}}{\text{total number of respondents in group}} \times 100.$

TABLE 13

RELATIVE FREQUENCY OF CITATIONS FOR SOURCES OF INFORMATION FOR DAYTIME/NIGHTTIME COMPARISON*

Type	Source		Indices of Citation Frequency** Daytime	Nighttime
Mass Media	TV	News	24.7	23.9
		PSA	8.9	9.2
		Talk Show	0.9	2.0
		Unspecified	7.2	6.2
		(Total-TV)	(41.7)	(41.3)
	Newspaper	Article	15.3	12.6
		Ad	0.8	0.8
		Unspecified	9.9	11.6
		(Total-Newspaper)	(26.0)	(25.0)
	Radio		5.9	6.1
	Billboard		0.7	0.8
Word of Mouth	Friend or Relative		10.2	10.3
	Work or School		2.3	3.6
	Club or Organization		0.2	0.4
	Doctor/Hospital-Verbal		0.6	0.9
	(Total-Word of Mouth)		(13.3)	(15.2)
Print Other	Pamphlet or Brochure		0.5	0.8
	Unspecified		6.7	7.4
	Overall Citation Index		94.8	96.6

*Results pooled across all nine surveys.

**Index of citation frequency (by time of day) $= \frac{\text{number of citations for a source}}{\text{total number of respondents}} \times 100.$

In still another comparison, the two different protocols for the Knoxville period 2 survey are contrasted in Table 14. It can be seen that almost without exception the positive responses obtained via the standard form dominate those obtained via the alternate form. The obvious inference is that, aside from random variation, keyed protocols tend to elicit more socially acceptable positive responses than nonkeyed protocols.

The Number of Citations per Aware Respondent

In general, each respondent who claimed an awareness of the law cited one or more sources of information to substantiate their claim. It is of interest to examine if the number of citations per aware person increases or decreases with time. That is, do the multiplicity of sources of information about the law have any measurable reinforcement effect, particularly as the comprehensive plan takes effect? To investigate the possibility, the ratio of the number of citations to the number of respondents claiming an awareness of the law was calculated for each operational period for Knoxville and Memphis by the dichotomous subsamples of parents of children under four years of age and others. The results are shown in Table 15. These ratios show that the basic state plan induces the same number of citations per aware person across both affected parents and others and that, initially, the same holds true for the comprehensive plan. However there is a cumulative effect attributable to the comprehensive plan, whereby parents of children under four years of age have a substantially higher citation ratio than the others in period 4 or similar groups from earlier periods. It is equally important to observe that there is no clear pattern in the citation ratio for the unaffected and nontargeted group.

Two comments are in order. First, Knoxville and Memphis are at opposite ends of Tennessee. While equivalent comprehensive plans were attempted, there were substantial a priori differences in the Memphis and Knoxville communities which were compounded with minor differences in PI&E implementation. The fact that the cumulative results are similar is, therefore, very important to note. Second, the reported longitudinal differences are, in fact, the consequence of post hoc interpretation of the data. As such, the results should be used only to indicate a hypothesis that needs to be tested further--that one of the benefits of longitudinal comprehensive PI&E programs is a reinforcement of the awareness in the targeted group.

Limitations of the Study

Since the comprehensive plan programs involved the use of mass media, there was no way to contrast the basic state and comprehensive plans within the same target area at the same time. In statistical terms, the PI&E programs could not be crossed with target areas within time periods. Thus, it should be recognized that the PI&E plans are necessarily confounded with target areas within operational periods, and any differences attributed to the plans must assume that other differences between the target areas are negligible. Moreover, the surveys represent random samples of those households that have phones with listed telephone numbers and whose residents are home at the time of the survey, rather than samples from the general adult population. Finally, it should be remembered that face-saving or socially acceptable responses may lead to inflated positive response rates.

TABLE 14

RELATIVE FREQUENCY OF CITATIONS FOR SOURCES OF INFORMATION FOR STANDARD AND ALTERNATE TELEPHONE PROTOCOLS (KNOXVILLE, COMPREHENSIVE PLAN, PERIOD 2)

Type	Source		Indices of Citation Frequency* for Protocols: Standard	Alternate
Mass Media	TV	News	14.8	12.9
		PSA	6.9	6.1
		Talk Show	2.2	1.8
		Unspecified	7.9	7.5
		(Total-TV)	(31.8)	(28.3)
	Newspaper	Article	13.3	14.0
		Ad	2.2	1.4
		Unspecified	12.3	8.3
		(Total-Newspaper)	(27.8)	(23.7)
	Radio		5.4	2.9
	Billboard		3.2	1.4
Word of Mouth	Friend or Relative		8.7	6.5
	Work or School		3.2	1.8
	Club or Organization		0.4	-
	Doctor/Hospital-Verbal		4.0	3.2
	(Total-Word of Mouth)		(16.3)	(11.5)
Print Other	Pamphlet or Brochure		1.4	-
	Unspecified		5.1	3.9
	Overall Citation Index		91.0	71.7

*Index of citation frequency (by protocol) = $\frac{\text{number of citations for a source}}{\text{total number of respondents}} \times 100.$

TABLE 15

RATIO OF NUMBER OF CITATIONS TO NUMBER AWARE PARENTS OF CHILDREN UNDER FOUR YEARS OF AGE VERSUS OTHERS FOR KNOXVILLE AND MEMPHIS: LONGITUDINAL COMPARISON

Target Area	Groups	Ratio of Number of Citations to Number Aware, by Period*			
		1 BSP	2 CP	3 ---	4 CP
Knoxville	Parents of Children < 4	1.44	1.31	---	2.04
	Others	1.41	1.31	---	1.70
Memphis	Parents of Children < 4	1.41	1.11	---	1.87
	Others	1.46	1.11	---	1.38

*Ratio = no. of citations/no. of people reporting an awareness of the law.

A second problem appeared to be bleeding of comprehensive plan type information into target areas designated to receive only the basic state plan. Some examples are:

- The Memphis-Shelby County Health Department had an on-going, independent CRD promotional campaign during the first six months of 1978. The campaign included the use of bumper stickers and billboards, and probably impacted the Memphis data.

- One television public service announcement and a number of radio public service announcements were released prematurely by the Tennessee Governor's Highway Safety Program office. This may have affected the basic state plan results for Memphis and Morristown.

- Morristown was within antenna reception range of Knoxville's TV broadcasts.

- Cable TV has become so widespread that it is likely that the comprehensive plan TV newscasts, talk shows and public service announcements shown on Knoxville TV were seen by a number of people in the Morristown and Chattanooga areas in the latter part of 1978.

- Television public service announcements on automobile safety were distributed in mid-1978 by the American Association of Oral and Maxillofacial Surgeons and by the Epilepsy Foundation.

- The Department of Health, Education and Welfare produced radio public service announcements promoting CRD use which were distributed early in October 1978.

- A Knoxville physician, Dr. Bushore, conducted a seat belts for children campaign from August through November 1977.

In general, professional standards were maintained throughout the surveys, but the above caveats should be kept in mind when interpreting the results.

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the tabulation of over 2,500 responses to telephone surveys conducted in target areas throughout the state of Tennessee, the following conclusions are drawn:

1. The comprehensive plan program engendered a more positive level of awareness of the law within a given period than the basic state plan program.

2. The comprehensive plan program brought about an increase in the awareness of the law across time periods above the level established by the basic state plan program.

3. Television was the primary vehicle for PI&E in this topic area, with newspapers a relatively poor second. As a consequence, the combination of television news program items, talk shows and public service announcements is judged to be an effective method for developing awareness of this public safety issue.

4. In general, radio was less effective than word-of-mouth communication through friends and relatives. However, in small town rural areas, radio was more effective, representing more than 10 percent of the relative strength of the communication network.

5. Billboards did not represent an expedious or effective means of mass media communications on this safety issue.

6. The medical field, even with the aid of pamphlets and brochures, did not represent an effective communications network on this safety issue for the general public, but this conclusion may belie its actual importance.

7. For those who were reportedly aware of the law in urban areas, there was a higher citation frequency under the comprehensive plan treatment than for the basic state plan treatment.

8. The targeted individuals, parents of children under four years of age, reported a higher level of awareness of the law than the general population, irrespective of PI&E plan, whether basic state or comprehensive.

9. There was an apparent cumulative effect, stimulated by the comprehensive plan, which led to more reinforcement of information about the law among the targeted group than in other groups.

10. A slight but nonsignificant increase in positive levels of awareness was apparent when contrasting nighttime samples to the results of daytime samples.

11. The positive results based on the standard telephone protocol of this study may be inflated by 20 percent or more as a result of socially acceptable responses.

12. Reported CRD ownership was clearly related to reported awareness of the law even after adjusting for face-saving responses.

Recommendations

1. The effectiveness of the long-term comprehensive plan program has been established with respect to awareness of the child passenger safety issue, but its cost-effectiveness has not been evaluated. Awareness appears to translate into action for only a small proportion of the targeted population. Therefore, it is recommended that a carefully controlled study be performed to evaluate the cost-effectiveness of a long-term comprehensive program directed toward the child passenger safety issue.

2. The direct results attributable to the pamphlets and brochures distributed through doctors' offices, hospitals, public health centers and the like were negligible in terms of awareness, but the long-term spin-off effects were not evaluated. It is recommended that a controlled long-term study involving the equivalent of the basic state plan be implemented to determine if secondary effects make such approaches worthwhile.

3. The overpowering influence of television was demonstrated once again. It is recommended that TV news programs, talk shows and public service announcements (of the gentle persuasion genre) be used to develop awareness of traffic safety issues.

4. Similarly, it is recommended that radio be used in rural areas as a vehicle for transmitting traffic safety messages, whereas use of radio in urban areas can be neglected if need be.

5. The long-term information reinforcement effects among targeted groups, due to comprehensive PI&E plans, should be investigated further.

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59-930. Safety belts and child passenger restraint systems required —Violations—Penalties.—(a) It shall be unlawful for any person to buy, sell, lease, trade or transfer from or to Tennessee residents, at retail, an automobile which is manufactured or assembled commencing with the 1964 models, unless such automobile is equipped with safety belts installed for use in the left front and right front seats thereof. All such safety belts shall be of such type and be installed in a manner approved by the department of safety of the state of Tennessee. The department shall establish specifications and requirements of approved types of safety belts and attachments. The department will accept, as approved, all seat belt installations and the belt and anchor meeting the specifications of the Society of Automotive Engineers. Provided that in no event shall failure to wear seat belts be considered as contributory negligence, nor shall such failure to wear said seat belt be considered in mitigation of damages on the trial of any civil action.

(b) Effective January 1, 1978, every parent or legal guardian of a child under the age of four (4) years residing in this state shall be responsible. when transporting his child in a motor vehicle owned by that parent or guardian operated on the roadways, streets or highways of this state, for providing for the protection of his child and properly using a child passenger restraint system meeting federal motor vehicle safety standards, or assuring that such child is held in the arms of an older person riding as a passenger in the motor vehicle. Provided that the term "motor vehicle" as used in this paragraph shall not apply to recreational vehicles of the truck or van type. Provided further that the term "motor vehicle" as used in this paragraph shall not apply to trucks having a tonnage rating of one (1) ton or more. Provided that in no event shall failure to wear a child passenger restraint system be considered as contributory negligence, nor shall such failure to wear said child passenger restraint system be admissible as evidence in the trial of any civil action.

(c) Violation of any provision of this section is hereby declared a misdemeanor and anyone convicted of any such violation shall be fined not less than twenty-five dollars ($25.00) nor more than fifty dollars ($50.00) for each violation of subsection (a) of this section and not less than two dollars ($2.00) nor more than ten dollars ($10.00) for each violation of subsection (b) of this section. [Acts 1963, ch. 102, §§ 1, 2; 1977, ch. 114, §§ 1, 2.]

Amendments. The 1977 amendment designated the former first paragraph as subsection (a), the former second paragraph as subsection (c), added subsection (b) and added the material at the end of subsection (c) following "fifty dollars for each violation."

Effective Dates. Acts 1977, ch. 114, § 3. January 1, 1978.

Law Reviews. Ellithorpe—Adoption of Crashworthiness Via Strict Products Liability (Gail O. Mathes), 4 Memphis State U. L. Rev. 497.

Cited: Ellithorpe v. Ford Motor Company (1973), — Tenn. —, 503 S. W. (2d) 516.

NOTES TO DECISIONS

1. Contributory Negligence.

Failure to wear seat belts does not constitute contributory negligence in Tennessee. Mann v. United States (1968), 294 Fed. Supp. 691.

In wrongful death action where defendant's automobile, after failing to yield right-of-way, struck the decedent's vehicle, an instruction as to possible remote contributory negligence of decedent because of his failure to wear a seat belt was precluded by the proviso in this section that states that a failure to wear seat belt shall not be considered contributory negligence. Stallcup v. Taylor (1970), 62 Tenn. App. 407, 463 S. W. (2d) 416.

APPENDIX B

FORMULA TO COMPUTE SAMPLE SIZE REQUIREMENTS

Consider the test of hypothesis of two proportions:

$H_o: \quad p_1 = p_2 \qquad H_1: \quad p_1 < p_2$ that can be tested, for large samples, using the z-test:

$$z = \frac{\hat{p}_2 - \hat{p}_1}{\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}}$$

The sample size requirements for this test are given by:

$$n = \frac{(z_\alpha + z_\beta)^2 (p_1 q_1 + p_2 q_2)}{\delta^2}$$

where $n_1 = n_2 = n$ (equal sample sizes)

$1 - \alpha$ = confidence level required when deciding to reject H_o

$1 - \beta$ = confidence level required when deciding to accept H_o

δ = size of difference that it is necessary to detect $[\delta = p_1 - p_2]$

p_1, q_1, p_2 and q_2 are all unknown, but can either be estimated, or be specified by worst case conditions ($p_i = q_i = .5$).

APPENDIX C

INSTRUCTIONS - CPSP TELEPHONE SURVEY

1. Each participant will have a complete list of Knoxville and Memphis phone numbers. The numbers in the lefthand column are the PRIMARY numbers to call. Those listed in the righthand column are alternate, back-up numbers.

2. Each participant will be assigned a section of numbers to call on each evening. Participants are not to call any numbers outside of their original section.

3. The lists of telephone numbers will be distributed and collected after each session, so as to avoid any confusion.

4. Let the phone ring six times.

5. In telephoning, the caller should move down the left side, PRIMARY list of numbers. If, after dialing, you hear:

   a) No answer - code accordingly and move to the right column, alternate number directly across from the last number dialed. If that number answers, return to the left column and continue dialing primary numbers.
   If the first alternate number does not answer or is busy, move up the alternate listing until a call is completed, then return to the primary, left column list.

   b) Busy signal - code the number as having been busy, move on to another primary number, and later return to the busy number.

   c) Operator intercept or recording - code accordingly, move to the alternate list and call as in the "no answer" procedure.

   d) If a child answers - code accordingly, ask for parent; if not home move to the alternate list.

   e) If the caller refuses to cooperate, hang up, etc. - code accordingly and move to alternate list.

6. At the completion of your section, return the entire list to the project supervisor.

APPENDIX D

CPSP TELEPHONE SURVEY
(Standard Form)

Hello, I'm _____, with The University of Tennessee and
(your name)

we are doing a brief survey which will take about 2 minutes to see how many people in _____ have heard about the new State Law which requires
(name of city)

children under 4 to be restrained while riding in a car.

1. Have you heard about the Law which was effective the 1st of this year?

_____ Yes (If Yes) _____ No (If No skip to 2)

a. How did you learn of the Law?

b. Is there any other way you may have learned of the law?

__T.V. { PSA__ / News__ / Talk Show__ / Merrit__ / Kids__ / Dawson

__Newspaper { Article / Ad__

__Radio { Christmas__ / 1st State__

__Billboard

__Pamphlet or Brochure

__Club or Organization

__Doctors Office { Verbal__ / Brochure__

__Friend

__School Program

__Hospital { Verbal__ / Brochure__

__At Work

__Other_____

2. Do you have children under 4 years of age?

_____Yes (If Yes) _____No (If No skip to "Thank You")

a. Do you have a child restraint device? (such as a car seat?)

_____Yes (If Yes) _____No

b. Did you get it since January of this year?

_____Yes _____No

(After all questions)

"Thank You"

I want to thank you very much for your time this evening. You have helped us with our survey which we hope will be a success. Good "rest of the evening" to you!

APPENDIX E

CPSP TELEPHONE SURVEY
(Alternate Form)

Hello, I'm _____ (your name), with The University of Tennessee and we are doing a brief survey on traffic safety in _____ (name of city)

1. Are you aware of any requirements for children under 4 years of age, to be restrained while riding in a car?

_____ Yes (If Yes, go to a) _____ No (If No skip to 2)

a. What specifically is that requirement?

_____Law (If Law go to b) _____Other (If Other skip to 2)

b. How did you first learn of this law?

__T.V. { PSA__ / News__ / Talk Show__	__Club or Organization
	__Doctors Office
	__Friend
__Newspaper { Article__ / Ad__	__School Program
	__Hospital
__Radio	__At Work
__Billboard	__Other_____
__Pamphlet or Brochure	

2. Do you have children under 4 years of age?

_____Yes (If Yes) _____No (If No skip to "Thank You")

a. Do you have a child restraint device? (such as a car seat?)

_____Yes _____No

(After all questions)

"Thank You"

I want to thank you very much for your time. You have helped us with our survey. Good day!