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Use of Child-Passenger Safety Devices in Tennessee

J. W. Philpot, K. W. Heathington, R. L. Perry, and E. C. Hughes, University of Tennessee, Knoxville

The combined impact of a Tennessee law on child-passenger safety and a promotional campaign for child-restraint devices on the rates of use of such devices is evaluated, and characteristics of users and nonusers are compared. A basic statewide public information and education (PI&E) program called for distribution of brochures and posters through such facilities as pediatricians' offices and hospitals. The comprehensive PI&E program consisted of an extensive mass-media campaign in addition to the basic program. Six target areas, including the five major metropolitan areas of the state, were chosen for the evaluation. The major findings are that the combination of the law and the basic PI&E program is effective in increasing the rates at which child-restraint devices are used, and the comprehensive program ensures an even higher rate of use. Cross tabulations of such use with other variables reveal that use of child-restraint devices is associated with (a) the age of the child, (b) all socioeconomic variables such as family income and education level, (c) other demographic and vehicle data, and (d) the wearing of safety belts. A market segmentation strategy for future PI&E programs is proposed.

Mandatory passenger-safety requirements have an uneven record in terms of public acceptance. For example, safety-belt interlock systems were rescinded by law after the public outcry against them, and, although the presence of safety belts has been accepted, their use has not. Recent legislation on child-passenger protection in Tennessee has created an opportunity to study the public reaction to a more limited passenger-safety law designed to protect children under four years of age.

After an extensive promotion campaign led by pediatrician Robert Sanders (1), the legislation was passed in 1977 and became effective on January 1, 1978, the first such state law in the nation. It requires in part that

> 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.

Since mere passage of the law does not ensure a reduction in the number of traffic deaths and injuries to Tennessee children, the National Highway Traffic Safety Administration (NHTSA) and the Tennessee Governor's Highway Safety Program jointly established the Child Passenger Safety Program in Tennessee. The purpose of this program is to publicize the law, educate the people of the state about the importance of child-restraint devices, and evaluate the effectiveness of these efforts. The project was implemented 3 months before the law went into effect so that baseline data on the use of child-restraint devices (CRDs) could be collected and public information and education (PI&E) programs could be designed and developed. The project began on October 1, 1977, and will continue for a 36-month period.

This paper is restricted to describing a portion of the results from the first nine months of the Child Passenger Safety Program; this comprises the three-month baseline period and the first six months of the PI&E program that began with the inception of the law. The descriptions of the sampling plan and the PI&E program have been limited to what is germane to the reported results. The purposes of this paper are to

1. Review the literature on the effectiveness and use of CRDs and on the efficacy of past PI&E programs,
2. Describe the characteristics of CRD user and nonuser groups,
3. Evaluate the effectiveness of PI&E programs in conjunction with the law, and
4. Suggest marketing strategies to improve the impact of PI&E on the rate of CRD use.

REVIEW OF LITERATURE

According to National Safety Council reports (2), children four years old and under sustained 1600 motor-vehicle-related deaths and injuries in 1976. Furthermore, the reports indicate that automobile accidents are the leading cause of death among children over one year of age. In Tennessee, 18 children under the age of five lost their

lives in automobile accidents in 1976. During the same period, 1229 injuries to children under five years of age were reported in the state by the Tennessee Department of Safety (3). It is believed that these reported cases underestimate the actual number of children adversely affected by automobile accidents.

Effectiveness of Restraint Devices

An unpublished Washington state safety-belt (and CRD) study conducted from 1970 to 1973 indicated that, if all children under the age of five were restrained at the time of an accident, fatalities could be reduced by 91 percent and injuries by 78 percent. A follow-up report to that study documented even higher protection rates. However, safety belts, if used alone, do not provide adequate protection for small children. Shelness and Charles (4) have pointed out that small children need to wear special CRDs. They cite reports that lap-type safety belts could slip on the child's abdomen and cause internal injury during a crash. They also note that children (especially infants), because of their proportionally short legs and large, heavy heads, are far more likely than adults to be thrown about in a vehicle in a collision.

An example of the ineffectiveness of safety belts for small children is the Australian experience. Since 1971, Australia has required the use of safety belts for all passengers in motor vehicles. During the period from 1972 to 1974, a 25 percent reduction in fatalities and a 20 percent reduction in injuries were reported in most categories. There were no significant reductions, however, in fatalities and injuries to small children (5).

Several effectiveness studies have addressed the adult-restraint component of the automobile safety system. An NHTSA report published in August 1976 (6) summarized the results of eight safety-belt studies and estimated that lap belts are 40 percent effective in reducing the number of occupant fatalities whereas lap-shoulder safety-belt systems are 60 percent effective.

The National Highway Safety Needs Report (7) concludes the following:

> In reviewing programs of crash prevention and injury reduction, one countermeasure stands out clearly superior to all other countermeasures, and is perhaps superior to a combination of several other leading candidates. This is the effectiveness of occupant restraint systems in preventing death once an automobile crash occurs.

More than 19 countries have recognized the public health benefits of safety belts by requiring some level of use by their citizens (8). Sweden is one example. A document of the Nordic Road Safety Council (9) attests to the efficacy of safety belts in saving lives and reducing the number and severity of injuries.

Use of Restraint Systems

Do people use passenger-restraining systems? Research on this and related questions has been intense.

In 1976, the Insurance Institute for Highway Safety reported that 93 percent of children under 10 years of age ride as passengers in vehicles without any type of restraint (10). That study, which observed child passengers traveling in automobiles to and from amusement areas and shopping centers in Maryland, Massachusetts, and Virginia, also shows that, of the children under 4 years of age who were riding in child-restraint devices, only 27 percent were properly restrained against death or injury. Thus, even people who are aware of the benefits of using child-restraint devices need education in their proper use.

Estimated rates of safety-belt use range from a high of 75 percent among occupants of 1974- and early-1975-model automobiles with starter interlocks to 22 percent during 1975 (11).

Evaluations of regulations compelling the use of safety belts have been reported from countries around the world. All of these studies found a substantial increase in rates of safety-belt use after the regulations went into effect (8). However, research reported by the Insurance Institute for Highway Safety (12) indicates that in Ontario, where a safety-belt regulation was enacted, the initial dramatic rise in safety-belt use was followed by a decline. The decline put the gain in the rate of use at about 25 percent rather than the 50 percent initially experienced. A similar pattern has been observed in Puerto Rico (13).

Effectiveness of Public Information and Education

Given the probability of a peak-decline pattern in rates of restraint-device use after the enactment of regulations that make the use of such devices mandatory, how can these rates of use be increased and maintained? A number of countries that compel the use of restraint devices have recognized this problem and operate some type of PI&E program as a countermeasure (8). Farr's research in England (14) indicates a gradual increase in the use of restraint devices since 1964 and a marked increase in 1973 that coincided with a large national advertising campaign. Based on an unpublished report by Scherz, all countries that have PI&E programs experience a 10-20 percent increase in usage. There are not enough data available, however, to differentiate between the various types of public information programs. On the negative side, PI&E campaigns for passenger safety are often ineffective, particularly those that use "scare tactics" (15, 16).

The obvious variation in the effectiveness of PI&E programs highlights the need for a better understanding of the driving population and of driving conditions as factors in the use of restraint devices. Williams (17) has investigated some of these factors and reported that parents' use of safety belts and level of education were important factors in the use of restraint devices by ninth-grade students. Education was an important factor in the parents' own report of use of such devices. Williams concludes that the use of restraint devices is associated with a variety of preventive health behaviors (17). The research of Neumann and others (18) supports this viewpoint. They reported that children most likely to be using appropriate CRDs had parents who used safety belts, who had completed high school, and who indicated an ability to control what happens to them in life. This California study also found that these children were over six months old and had parents who were white, married, and born in the United States (18). Additional research concerning use of and attitudes toward CRDs is currently being conducted in Australia (7).

Lonero and others (19) report that parents of children who participated in an elementary school program on safety-belt use were observed using their safety belts more frequently than other parents. These studies seem to suggest a reciprocal "safety socialization" effect between parents and children. It is not particularly surprising that parents may have this effect on children, but it is important to note the potential impact of children on parental behavior.

Health professionals have been extremely active in alerting others to the importance of CRD use. Many recommendations for increasing such use have focused on physicians as an information delivery system. Kanthor (20) studied the effect of prenatal counseling on 35 women

and found that 69 percent of counseled women and 42 percent of uncounseled women were using a safe CRD at the six-week checkup visit.

Pless and others (21) asked people in a telephone survey to report on sources from which they obtained information on child-passenger accident prevention. Only 46 percent of the respondents reported receiving such information from any source. Fifty percent of the respondents who indicated that they had received advice cited the news media as the source. Another 13 percent cited friends as their source of information, and 12 percent cited relatives. It is somewhat surprising that none of the respondents cited physicians until they were prompted by the interviewers.

Allen and Bergman (22) investigated the effects of three different educational approaches to increasing ownership of CRDs. They based their education efforts on social learning theory and found that CRDs were purchased by 54 percent of those parents who only received descriptive literature, by 71 percent who received literature and saw a film, and by 60 percent who received literature, saw a film, and saw a CRD demonstration.

In a similar study by Arnberg in Sweden (23), parental acceptance of rearward-facing CRDs was studied. Arnberg reported that parental acceptance of such devices increased with actual experience in using them.

Christopherson (24) has conducted research on the improvement of children's behavior through CRD use. His results indicate that children's behavior improves dramatically when they are introduced to CRDs and begin to use them.

Generalizations

Several generalizations seem to emerge from the literature review:

1. Properly used safety belts and CRDs are effective in reducing death and injury.
2. Automobile occupants are more likely to use appropriate restraint systems when there are regulations that compel such usage and some type of PI&E program exists.
3. The use of safety belts by adults is correlated with the use of restraint devices by child passengers.
4. Further investigation of the influence of various PI&E programs and other factors associated with the use of restraint devices is necessary for the development and maintenance of high rates of proper usage.

RESEARCH METHODOLOGY

A data collection plan was devised to obtain information on use of CRDs before and after enactment of the Tennessee law. The data collection involved a complex collection system, with two data collection intervals six months apart at each of six selected target areas. These areas include five major urban centers (Memphis, Nashville, Chattanooga, Knoxville, and the Tri-Cities) and one "rural" area (composed of merged data from Dyersburg, Columbia, and Morristown). The baseline data collected at the end of 1977 provided information such as the number of people using safety belts, the use of child-restraint devices, demographic characteristics of the population surveyed, and other data vital for evaluating the impact of the PI&E program. To make the estimates of CRD use, two data collection "tiers" were used. The first tier was observational; the second included a second observation, a personal interview, and a self-administered questionnaire.

The tier 1 instrument was designed to record essential observed data in a matter of seconds. The observations were performed at entrances to shopping centers, public health centers, and children's hospitals—locations to which small children might be transported by their parents or guardians. The data collected included the position of the child passenger in the vehicle, use or nonuse of safety belts by the driver, and the license plate number of the vehicle for identification purposes. The tier 1 instrument was designed to record data for vehicles in which there were children estimated by the observer to be younger than four years of age. License plate numbers were recorded for those vehicles and, where possible, matched with the next tier level. About 50 percent of the observations recorded at tier 1 were also recorded at tier 2.

Tier 2 was designed to gather specific information about the child, the driver, the other passengers, and the vehicle and to verify CRD and safety-belt use. Tier 2 information was collected by using a combination of observation, an interview by a trained interviewer, and a self-administered questionnaire. The self-administered portion of tier 2 was designed to collect demographic data on drivers who were transporting children younger than four years of age. The tier 2 data from the baseline period provided a profile of CRD users and nonusers.

The procedures for data collection included the use of two-way radios by observers and interviewers to track vehicles with small children. Field workers were trained in observation and interviewing techniques, two-way radio communication procedures, and specific problem areas. Observers were trained to collect tier 1 data, and interviewers were trained to collect tier 2 information.

Except for the data interval in Nashville after the introduction of a comprehensive PI&E plan, for which a minimum sample size of 500 was selected, a minimum combined tier 1 and tier 2 sample size of 400 per target area was established.

The PI&E program consisted of two levels: (a) a basic state program (BSP), which included statewide distribution of brochures and posters, and (b) the comprehensive program (CP), which consisted of an intensive mass-media campaign and other promotional activities in the Nashville area. The comprehensive program incorporated the basic state program and added the use of public service announcements and interviews on television and radio, newspaper articles, outdoor advertising, displays, and contacts with special-interest groups.

The initial measure of effectiveness for either level of the PI&E program is the change in the rate of use of CRDs. Based on Scherz's unpublished study, it is expected that significantly increased use will also bring about a reduction in death and injury rates. It is recognized that CRD use and proper use are not the same thing. However, even if the rate of proper use remains near 30 percent, an increase in the rate of use will bring about a corresponding increase in the number of properly used restraint devices.

The outline of the PI&E implementation and evaluation plan, and the comparisons that can be made, are shown in Figure 1. These comparisons require careful estimation of rates of CRD use. Each rate for a given target area within a data interval is calculated by using a weighted combination of nonoverlapping data from two sources. The first data set consists of those vehicles whose licenses were observed at tier 1 but for which no tier 2 data were recorded; the second set consists of the matched tier 1 and tier 2 data along with some tier 2 observations for which there are no matching tier 1 license numbers. Estimates from the second data set are based solely on the tier 2 information. Estimates

Figure 1. PI&E implementation and evaluation plan.

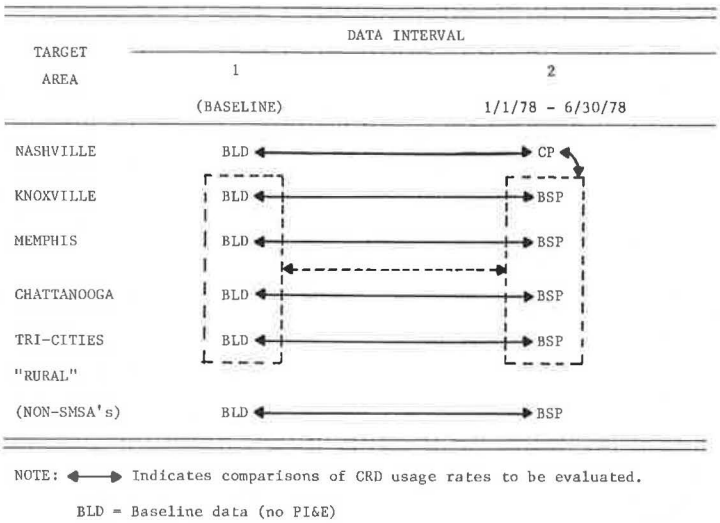

Table 1. Rate of CRD use by data group.

Group	Category	CRD Use[a] (%)	Level of Significance
Characteristics of child passenger			
Age	≤1 year	24.6	
	1-2 years	18.8	
	2-3 years	8.1	<0.001
	3-4 years	5.5	
Sex	Male	13.7	NS
	Female	14.2	
Socioeconomic status			
Annual family income	$0-$4999	8.7	
	$5000-$9999	9.4	
	$10 000-$14 999	14.7	
	$15 000-$19 999	18.6	<0.001
	$20 000-$24 999	19.4	
	$25 000-$29 999	20.9	
	>$30 000	31.0	
Education	Less than high school degree	5.4	
	High school or G.E.D. degree	10.4	
	Vocational or technical school degree	14.9	
	Some college	17.4	<0.001
	College degree	25.0	
	Graduate degree	27.0	
Employment status of couples	Both employed	12.2	
	One employed, one unemployed	14.9	
	One employed, one homemaker	18.5	<0.025
	One employed, one student	13.9	
	Both unemployed	5.3	
Owner of observed vehicle	Yes	15.5	<0.001
	No	6.6	
Number of automobiles owned	One	10.7	
	Two	17.0	<0.001
	Three or more	13.4	
Other demographics			
Sex of driver	Male	12.6	<0.05
	Female	15.6	
Driver's relation to child	Parent	15.1	<0.001
	Not parent	3.3	
Marital status of respondent	Married or living with mate	15.0	<0.025
	Other	8.4	
Number of children younger than age 4 in vehicle	One	12.8	
	Two	20.7	<0.001
	Three or more	27.3	
Use of safety belts			
Driver	Yes	40.6	<0.001
	No	11.6	
Driver and all passengers over age 4	None	9.1	
	Some	24.9	<0.001
	All	34.8	
Vehicle data			
Size of automobile	Subcompact	15.2	
	Compact	12.9	NS
	Full-sized	15.4	
Automobile manufacturer	American Motors	9.7	
	Chrysler	16.5	
	Ford	12.3	NS
	General Motors	14.7	
	Foreign	17.6	
Year of vehicle	1973 or older	12.6	<0.05
	1974-1978	15.8	
Body style	Station wagon	19.6	<0.05
	Other	13.9	

[a]In this context, the rate of use is for the most-restrained child under four years of age. More than 87 percent of vehicles contained just one child, so the figures are close estimates of overall CRD use.

from the first data set are calculated from the tier 1 observations but are adjusted for "over-age observations" (based on the proportion of over-age children encountered at tier 2). The results from both data sets are then pooled to obtain the reported rate of use of CRDs.

RESULTS

Characteristics of CRD Users and Nonusers

The tier 2 data collected during the baseline period were used to obtain a profile of CRD users and nonusers. The data from all six target areas were combined (for a total of 2504 tier 2 observations), and cross tabulations of CRD use versus the other items on the questionnaire were performed. These gave usage rates for the various subgroups and provided chi-square tests of significance. The results of these analyses are given in Table 1. For discussion purposes, the questionnaire items have been arranged in five groups: characteristics of the child, socioeconomic-status variables, other demographics of the occupants, use of safety belts, and vehicle data.

The characteristics of the child have contrasting effects on the rate of CRD use. The age of the child is a major factor in the use of CRDs. The data given in Table 1 show that the usage rate declines markedly with increasing age of the child, from 24.6 percent for infants to 5.5 percent for three- to four-year-olds. In general, infants not only appear more vulnerable but also are

usually more compliant than older children and in any event must be carried in some device or by another person. Apparently, a CRD satisfies the protective instincts of the person in charge of the child as well as any other infant-carrying device. The sex of the child appears to have no significant effect on the rate of CRD use.

Demographic variables that are primarily measures of socioeconomic status are all significantly related to CRD use. There is a steady increase in the rate of CRD use as family income level increases. Exactly the same phenomenon is apparent for the education variable. Similar patterns have emerged before in studies of safety-belt use (17, 25) and were expected to carry over to CRD use. It seems reasonable that those who have more education and more discretionary income are more likely to purchase and use CRDs.

Rates of CRD use for another socioeconomic variable, the employment status of couples, show differences that may have other sociological implications. On the one hand, when neither mate is gainfully employed, the usage rate is low, as one would expect on the basis of the family-income variable. But the highest rate of CRD use occurs when one mate has paid employment and the other is a full-time homemaker. These results may be tied in with income, since it is possible that a large proportion of those who stay home with their young children are members of more affluent families.

The next socioeconomic variables involve automobile ownership. People who use a vehicle that they own show a higher rate of CRD use than those who use a borrowed vehicle. This is to be expected because (a) the law does not apply to borrowed vehicles, (b) it is not easy to transfer a CRD from one vehicle to another, (c) respondents who do not own a motor vehicle are unlikely to own a CRD, and (d) not owning a vehicle may indicate low socioeconomic status.

The use of CRDs is also a function of the number of vehicles owned. People who own two motor vehicles are more likely to use CRDs than either those who own just one vehicle or those who own three or more. The low usage rate for this last group was unexpected, but it may be a reflection of the difficulty of transferring a CRD from automobile to automobile. It can be conjectured that some people who own one automobile are financially disadvantaged and that the low rate of use for one-automobile owners is connected with the low-income effect.

Other demographic measurements are also related to CRD use. A significant difference in rates of CRD use was found among male and female drivers. Female drivers were more likely to be using CRDs than male drivers. This may be attributable to the fact that more female drivers transport children who are younger than four years of age without other adults in the vehicle. If so, the drivers are not only required by law to use a CRD but also may find it more convenient to use one in the absence of other assistance.

The driver's relationship to the child is highly significant. Youngsters are protected by their own parents at a much higher rate than by those who are not their parents (15.1 versus 3.3 percent). People who were transporting child passengers and were not the children's parents had the lowest rate of CRD use of all respondents. Although a child under four years of age is in a vehicle operated by someone other than its parents only 12 percent of the time, the child is very likely to be unprotected during that period. For example, the data revealed that none of the young children who were in the care of retired people were placed in CRDs. Since the Tennessee law does not apply to anyone but parents and guardians, some warning should be given to the public regarding the vulnerability of children in these unprotected situations.

The marital status of respondents shows a pattern similar to that for parental relationship. Those who are married or living with a mate are more likely to make use of a CRD than those who are single, divorced, or separated. However, the difference in usage rates between these two groups is less dramatic (15.0 versus 8.4 percent) than the difference between parents and nonparents.

Finally, as the total number of children younger than four years of age in the vehicle increases, there is a significant increase in the likelihood that at least one of the children will be in a CRD. There are several plausible explanations for this: For example, CRDs may provide convenient mechanisms for separating children in the vehicle.

Measurements of safety-belt use, either for the driver alone or for the driver and other passengers aged four or older, show a clear relation with CRD use. Drivers who use safety belts are much more likely to make use of CRDs than those who do not use safety belts. In fact, of all the categories examined, the one with the highest rate of CRD use is drivers who use safety belts. When self-reported safety-belt use by all vehicle occupants aged four or older is examined, the data are again quite clear: Increased safety-belt use is related to increased CRD use. It appears that a child's safety is more likely to be provided for when there is a general awareness of safety considerations. Lonero and others (19) have already suggested that there may be a reciprocal safety-awareness relationship between parent and child, at least when children are verbal. This result, combined with the results of our study, indicates that a CRD campaign that is tied in with a safety-belt campaign might have particular benefit for children who are beyond the infant stage.

There is a relatively weak relation between CRD use and type of vehicle. Automobile size and manufacturer have no apparent relation with CRD use, and body style and year of manufacture show a somewhat tenuous relation. Station wagons are more likely to have a CRD in use than other types of motor vehicles, but two comments are in order: (a) Station wagons cost more than comparable sedans, and (b) station wagons are often found in multiple-automobile families. Both comments suggest the possibility that station-wagon ownership is not independent of income and that the rate of CRD use found among occupants of station wagons may be a consequence of income.

The division by year in the vehicle category was chosen because 1974 is both a recent year and the year in which safety-belt interlocks were mandated. Although the starter-interlock systems were outlawed almost immediately, the trend has been to make more acceptable safety devices standard on the more recent models. Drivers of newer automobiles might therefore be more safety conscious than those who drive older automobiles, which could account for the higher rate of CRD use among those who drive the 1974-1978 models. The interpretation, however, is clouded by the fact that the affluent tend to own late-model automobiles, and so the results may again indicate the influence of income.

Rates of CRD Use

The question remains, Can either the basic or the comprehensive levels of PI&E, in conjunction with the law, effectively promote the use of CRDs? The results are given in Table 2; they are based on the combined, nonoverlapping data from tiers 1 and 2. The data indicate that the basic state program accounts for an average in-

Table 2. Comparison of rates of CRD use by type of PI&E program.

Target Area	Level of PI&E	Baseline[a] Effective Sample Size	Baseline[a] CRD Use (%)	With Program[a] Effective Sample Size	With Program[a] CRD Use (%)	Change in Percentage of CRD Use Increase	Change in Percentage of CRD Use Level of Significance
Nashville	CP	821	14.0	737	22.1	8.1	0.10
Memphis	BSP	869	10.9	532	13.5	2.6	≥0.005
Knoxville	BSP	912	12.8	711	20.4	7.6	0.10
Chattanooga	BSP	749	10.9	742	16.5	5.6	0.10
Tri-Cities	BSP	990	10.7	519	17.9	7.2	0.10
Avg for BSP cities		880	11.3	626	17.3	6.0	0.10
Rural	BSP	872	6.5	521	12.5	6.0	0.10

[a] Estimates based on weighted averages of tier 2 and age-adjusted tier 1 data.

crease in CRD use of 6.0 percentage points in the four urban target areas, or a 53 percent increase over the baseline, and an increase of 6.0 percentage points in the rural target area, or a 92 percent increase over the baseline. The comprehensive PI&E program for Nashville produces an increase of 8.1 points, or a 58 percent increase over the baseline. All changes are statistically significant ($p < 0.10$ or better). To evaluate the additional effects of the comprehensive PI&E program, the change in percentage of use of CRDs in Nashville (8.1 percent) is compared with the average change in the percentage of use for the four urban target areas that received the basic program (6.0 percent). The changes in the rates of use are not significantly different, although the comprehensive program accounts for an increase of an estimated 2.1 percentage points.

Although the increases in the rates of CRD use are real, the question of program cost-effectiveness must be addressed. The basic state program is a low-cost activity that consists primarily of preparing, printing, and distributing brochures and posters. The attendant labor costs have been held to a minimum by using existing family-related agencies to assist in distribution. The benefits are the expected reductions in deaths and serious injuries among children under four years of age. The benefit from avoiding one or two serious accidents would make the program cost-effective when just the hospital and medical costs are considered.

A similar but more extended argument could be made for any additional effect of the comprehensive PI&E program, and the cost-effectiveness has been evaluated by Heathington and Perry (26). The rate of CRD use for Nashville was increased by an estimated 2 percentage points at a cost of less than $6000. The benefits estimated for the comprehensive program are neither dramatic nor significant, but the increase permits a similar claim to be made: The avoidance of a few serious accidents is worth the cost.

Realistically, however, the strength of the support for the comprehensive program lies in the emotional appeal of protecting young children, which will probably outweigh the impact of any cost-effectiveness study. It is anticipated that the comprehensive PI&E program will continue and will produce measurable benefits.

RECOMMENDATIONS

The target population for the CRD promotional activities consists of all Tennesseans who travel in motor vehicles with children who are younger than four years of age and is not limited to those covered by the state law. The first six months of the PI&E campaign concentrated on the use of television, radio, newspaper, and billboard messages directed at the mass audience and distribution through pediatric clinics of brochures and posters that focus on an audience consisting primarily of parents with young children. The campaign has been moderately successful, judging by the increased use of CRDs. However, to sustain the impetus of the drive, new market segmentation strategies need to be devised that can be operated within the necessary constraints.

The profiles that emerged from the study of characteristics of CRD users and nonusers indicate that the major differences in the rates of CRD use are related to socioeconomic status and use of safety belts. The PI&E activities should capitalize on this information. In addition, given the success of the basic state program, any group that has a high concentration of the target population should be singled out, as was done for the clientele of pediatricians' offices. Another market segment that can be used is the so-called "tastemaker" group, which is generally composed of the young and/or the affluent.

Three approaches to these different market segments appear to merit special attention. The first is to attempt to directly influence the rate of CRD use in the low socioeconomic group by implementing a loaner program administered through social service agencies and by distributing CRD promotional brochures through these same agencies.

The second approach is to attempt to influence the tastemakers of society with the expectation that increasing their use of CRDs will have a multiplier effect on the rest of the target population. Examples of this second approach are placing posters, displays, and brochures in new-automobile dealerships to reach the high socioeconomic group, distributing brochures to married students through college health facilities, and incorporating a CRD module in high school driver-education programs.

The final approach consists of revising the PI&E campaigns that cut across all socioeconomic groups. Mass-media public service advertisements can be used to promote the tie-in between use of safety belts and use of CRDs. The effort to distribute brochures to groups that contain a large concentration of the target population should be redoubled; these groups can be reached through offices of pediatricians and obstetricians, prenatal clinics, maternity wards, public health clinics, and day-care centers.

CONCLUSIONS

The new Tennessee law on child-passenger safety, combined with the PI&E program to promote the use of CRDs, has been effective in raising the rates of CRD use. The basic state PI&E program accounts for an increase of 6.0 percentage points in both rural and urban areas. The comprehensive PI&E program accounts for an estimated increase of 2.1 percentage points over the basic state program for the urban areas, but the increase is not significant. Whether the peak-decline phenomenon encountered with other mandatory passenger-safety programs will occur cannot yet be determined based on the data of this study. The proposed market segmentation strategies are expected

to reduce the anticipated decline for the immediate future.

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Use of Safety Belts in Kentucky

Kenneth R. Agent, Michael Barclay, and Robert C. Deen,
Kentucky Department of Transportation, Lexington

The use and effectiveness of safety belts in Kentucky are examined, and factors that affect their use are identified. Data were obtained from three sources: field observations, accident reports, and a questionnaire. Kentucky drivers and passengers were found to have lower rates of safety-belt use (slightly less than 10 percent) than drivers and passengers in other states. The accident data showed that safety belts reduced the chance of being killed by a factor of six and the chance of being severely injured by a factor of two. Several factors were found to have significant effects on the use of safety belts. Safety-belt use was higher among drivers who were over 25 years of age, those who had a college