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16. Abstract <p>The 1982 Kentucky General Assembly enacted a law requiring use of child safety seats for children 40 inches or less in height. To evaluate the effectiveness of this law, usage surveys had to be completed before and after the law became effective. This study summarizes data collected one year after enactment of the law and compares this with "before" data.</p> <p>One year after enactment of the mandatory usage law the statewide child safety seat usage rate was 22.7 percent. This compared to 14.4 percent usage before the law and represents a statistically significant increase. Usage increased in 18 of the 19 cities surveyed. Proper usage remained a problem. Only 50 percent of the child safety seats were used properly. A statewide driver safety belt usage rate of 5.8 percent compared to 4.2 percent the year before.</p> <p>The increase in usage of child safety seats may be attributed to both enactment of the mandatory usage law and increased educational and promotional campaigns. Modifications, which should strengthen the existing law, were recommended.</p>			
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Research Report  
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CHILD SAFETY SEAT USAGE IN KENTUCKY AFTER ENACTMENT  
OF A MANDATORY USAGE LAW

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## INTRODUCTION

Use of child safety seats or safety belts is an effective means of reducing injuries to children involved in motor-vehicle accidents. However, usage of these restraint systems has remained low. In an attempt to increase usage, a law was enacted by the 1982 Kentucky General Assembly requiring use of a "child restraint system" for children 40 inches or less in height. This law became effective July 15, 1982. A copy of the law is presented in the Appendix.

The objective of this study was to evaluate the effectiveness of the law. Observational surveys were conducted before and after its implementation. The "before" survey was performed in May and June 1982 and results were presented in a previous report (1). A statewide child safety seat usage rate of 14.4 percent was observed with another 1.0 percent using safety belts. Only 44 percent of the safety seats were used properly.

The "after" survey was performed in May through August 1983. Identical numbers of data were obtained in the same cities as in the "before" survey. Results from those two surveys were compared and changes in usage were noted. Also, Kentucky's current law was compared to similar laws across the country.

## PROCEDURE

### IDENTIFICATION OF AVAILABLE RESTRAINTS

The same data collectors were used to conduct the "after" as conducted the "before" survey. These people were required to become reacquainted with the child safety seats previously available as well as any new seats. A guide to available restraints published by the American Academy of Pediatrics was used (2). Letters were sent to all major manufacturers, and pertinent literature was reviewed.

A list of various child safety seats examined while preparing for this study is presented in Table 1. The manufacturer and seat name are shown, as well as a description of the type of protection

afforded and the age range for which the restraint is to be used. Usage requirements for each restraint had to be known in order to determine whether the restraint was used properly. For example, when a tether was required but not used, the restraint would be classified as improperly used. As part of the training process, a notebook was prepared with photographs and literature describing the various seats. That notebook was used for review and during the data collection process.

### DEVELOPMENT OF SAMPLING PLAN

The same sampling plan used in the original survey was used. The sampling plan was developed to assure a statistically valid sample for cities of various sizes distributed across the state. The sample size was determined so that relative error of the observed proportion (percent using child safety seats) would be within acceptable bounds for a given probability. The required sample size was determined using the following formula (3):

$$n = (X)(1 - p)/((d^2)(p)) \quad (1)$$

in which  $n$  = sample size,  
 $X$  = cumulative Chi-square distribution for a given probability and one degree of freedom,  
 $d$  = bound on the relative error of the proportion, and  
 $p$  = true or assumed proportion.

A probability of 0.95 was assumed. The sample size required would vary as a function of the proportion of children using child safety seats and the bound required on the relative error. For a proportion between 10 and 15 percent and a 10 percent upper bound on relative error, the required sample size varies from 2,176 to 3,456. For a proportion of 15 percent and a 5 percent upper bound on relative error, the required sample size increased substantially to 8,704. The original

assumption was made that the observed proportion would not be much lower than 15 percent. For a sample size of 5,000, this would yield a 6.6 percent upper bound on relative error. Observations showed 14.4 percent of children were in safety seats (1). This percentage should increase in the "after" survey. For the sample size of 5,000 and a usage proportion of 25 percent, the upper bound on relative error would be 4.8 percent.

The sample had to be distributed across the state and be representative of a range of populations to account for social and economic factors. The sample distribution was based on county population categories. From the 1980 census, the number of children under five years old in each county was used to distribute the sample. This was the youngest age category available in census data. The sample size necessary for each population category, as well as the survey counties and cities selected, are listed in Table 2. Counties were selected so that a distribution across the state would be obtained. The largest city in each selected county was chosen for data collection. City populations varied from 298,451 in Louisville to 3,967 in Carrollton.

#### DEVELOPMENT OF DATA COLLECTION PLAN

The data collection plan used in the pre-legislation survey (1) was used in the "after" study. The data collection form is shown in Figure 1. The procedure involved collecting data by observations without interviews. This allowed data to be collected more quickly and observers were able to gather all necessary data. That procedure allowed data to be collected by one person. Three observers collected all data, minimizing training requirements. Substantial training was still necessary to acquaint data collectors with the various restraints and their proper usage.

An explanation of information collected is given in Figure 2. The data sheet was divided into three sections. General information described when and where data were collected. The section pertaining to cars containing children

under four years included basic information concerning type of safety seat used and, when used, the brand and whether it was used properly. Information was also obtained for the driver of any vehicle containing a child under four years of age. That information consisted of the driver's age category, sex, and safety belt usage. A third section of the data sheet contained similar information for drivers of other vehicles. Safety belt usage was obtained for drivers of those vehicles at times when that data collection did not interfere with the collection of child safety seat data.

Child safety seat usage was obtained only for children under four years of age. Kentucky's law requires the use of child safety seats for children 40 inches in height or less. Since no interviews were conducted, a judgment concerning age or height had to be made, and the decision was made to use four years of age as the cutoff. Children were further classified as being less than one year old or from one through three years old. In this report, children less than one year of age will be referred to as "infants", and children from one through three years of age will be termed "toddlers".

Data were collected at the same sites as those used in the prelegislation survey. Sites were located either at traffic signals or four-way stops. Some general instructions were followed during data collection. Manuals providing suggestions for data collection procedures were reviewed when developing the data collection plan (4, 5). A summary of some of the major instructions follows:

1. Data will be collected by observation. Data collectors should attempt to be as inconspicuous as possible and avoid conversation, when possible. A message stating "TRAFFIC SURVEY" will be placed on the backs of all clipboards.

2. Data will be taken at intersections having either a traffic signal or four-way stop control. Observers will stand on the curb or at the edge of the roadway and observe stopped cars. Data may also be included for cars as they begin moving through a signalized intersection if the car is moving slow



enough to allow accurate data collection. Only passenger cars and station wagons are to be included. Trucks, vans, or vehicles used for commercial purposes, such as taxicabs, should not be included.

3. All data should be collected during daylight hours at various times throughout the day.

4. Priority will be given to any car containing a child under four years old. Driver safety belt information for other cars will be collected when time permits.

5. Observers shall use their best judgment in estimating age. However, they shall not guess on child safety seat usage. When the type of safety seat cannot be determined, it should be left blank.

~~6. Proper or improper usage, along with the reason for improper usage, should be determined whenever possible, even when the type of child safety seat cannot be determined.~~

#### DATA ANALYSIS

The child safety seat data were entered into a computer file. This allowed summaries and cross-tabulations to be performed rapidly for any of the recorded data. Safety belt usage data for drivers of vehicles not containing children under four years were summarized manually.

A comparison was made of data taken before and after implementation of the mandatory usage law. This included a statistical analysis to determine when statistically significant changes had occurred (6).

#### RESULTS

##### USAGE RATES

A summary of statewide usage of child safety seats after enactment of the mandatory usage law is shown in Table 3. A sample size of 5,000 children, identical to the "before" survey, using the distribution shown in Table 2, was used. The data were collected from May through August of 1983 or approximately one year after the effective date of the law on

July 15, 1982.

Statewide, the survey showed that 22.7 percent of children under four years of age were in child safety seats. That compared to 14.4 percent in the "before" survey. The number of children observed in a child safety seat increased from 718 to 1,136. That represents a 58 percent increase in usage.

Only 50 percent of the child safety seats were used properly (compared to 44 percent in the "before" survey). Applying this factor to the 22.7 percent usage rate shows that only 11.4 percent of the children were properly restrained.

An additional 74 children (1.5 percent) were using safety belts. That was an increase from the 1.0 percent in the "before" survey. ~~Therefore, 24.2 percent of the children were restrained in some manner "after" as compared to 15.4 "before".~~ This compares to a national usage rate of 26.9 percent for children from birth through five years of age.

Equation 1, with a sample size (n) of 5,000, a probability of 0.95, and a proportion (p) of 22.7 percent, yielded a bound on the relative error of the proportion (d) of 5.1 percent. When applied to the observed proportion (22.7 percent), this yielded an absolute error of 1.2 percent. Therefore, confidence limits of statewide child safety seat usage were 21.5 to 23.9 percent.

Safety seat usage varied as a function of county population category with higher usage rates in the more heavily populated counties. The increase in usage after enactment of the law also varied with county population category. The smallest increase (from 7.7 to 8.1 percent) was for the least populated counties. The largest increase (from 10.4 to 24.1 percent) was for the next to highest population category. The percent properly used did not vary with population category although the lowest percent properly used was observed for the smallest population category.

Usage of child safety seats, by city, is shown in Table 4. As before, usage was highest in the larger cities. The percentage using safety seats ranged from 43.4 percent in Lexington to 5.7 percent

in Lawrenceburg. Proper usage showed no definite relationship to city size and ranged from 64 percent in Glasgow to 28 percent in Princeton.

A comparison, by city as well as statewide, of child safety seat usage before and after the mandatory usage law is provided in Table 5. Both the before and after usage percentages are shown as well as the percent change in that percentage. Results of a test used to determine when the differences were statistically significant is also shown. The test used compares two observed proportions and determines when the characteristic proportion for "A" differs from that for "B" (6). A level of statistical significance of 0.95 was used.

There was an increase in child safety seat usage in 18 of the 19 cities. In Lawrenceburg, usage dropped from 7.0 to 5.7 percent. That resulted from a drop from 11 to 9 in the number of safety seat uses observed. This decrease was not statistically significant. The percent increase varied from 201 percent in Somerset to 6 percent in Princeton. The increase was determined to be statistically significant in eight of the cities. Also, the increase statewide was statistically significant. If larger samples were obtained, some of the other cities would have shown a statistically significant increase.

A notation was made when a child safety seat was in the vehicle but was not used. That was noted in 218 cases. Usage could have been increased by another 4.4 percent in the event all available safety seats had been used.

#### FACTORS AFFECTING USAGE

Several other factors, shown in Table 6, were noted as being related to child safety seat usage. Those relationships were very similar to those observed in the "before" survey. As the number of small children in the car increased, safety seat usage decreased. There was a large reduction in usage when there were more than two small children in a car. Usage was especially related to age, with the usage rate for infants (41.0 percent) more than twice that for toddlers (19.1

percent). Usage was also much higher for children in the rear seat when compared to children in the front seat. Driver age and sex were also related, with usage higher when a female rather than male was driving and usage lower when an older person was driving.

Of particular interest was the relationship between the restraint usage of the driver and that of the child. A large percentage of children wore safety belts (19.6 percent) when the driver also wore a safety belt. About 85 percent of the children were restrained by a child safety seat or safety belt when the driver was also using a safety belt.

The percent of proper usage was lower when more than two children were in the car and higher for children in cars in which the driver was using a safety belt.

#### SEATING POSITION OF UNRESTRAINED CHILDREN

The seating position of unrestrained children is summarized in Table 7. That summary is interesting because of the small number (23.1 percent) of unrestrained children who were properly seated. The most common mode of travel for unrestrained toddlers is standing on the seat, primarily the front seat. Slightly over 30 percent of all unrestrained children in the front seat were standing on the seat. A traffic accident would not be necessary to cause a serious injury to a child standing in the front seat. A sudden stop would cause a child to be thrown from the standing position into the windshield or dashboard. Another large portion of toddlers were observed sitting on the front edge of the seat. The most common method of travel observed for an unrestrained infant was in the lap of an adult.

#### SUMMARY BY TYPE OF RESTRAINT

Usage of various types of child safety seats is summarized in Table 8. Data are presented for all children, for infants only, and for toddlers only. For each safety seat, the number observed is listed as well as the percentage properly used. Observers were trained to identify specific seats and their proper usage, and information regarding type and usage was

obtained for a high percentage of safety seats.

The Strollee Wee Care model was the single most frequently noted safety seat of all models observed. Questor Kantwet had the highest number of safety seats noted of any single manufacturer. The Questor Kantwet One-Step was its most commonly observed seat and was the second most frequently observed model of all safety seats noted. The Bobby-Mac Champion and Deluxe II, currently distributed by Questor Kantwet, were also common as was the Dyn-0-Mite infant seat. There were also a large number of safety seats observed from Century and Cosco/Peterson. The most common Century model was the Century 100, while the most common Cosco/Peterson model was the Safe-T-Seat. An old type safety seat, not currently available, also was observed frequently. That type was made by more than one manufacturer and may be distinguished by a separate headrest and armrest. A harness is required for proper use. Use of the harness was seldom observed. The child and infant Love Seats were also observed frequently.

Proper usage varied substantially for the various safety seats. Of the most common safety seats, Strollee and Bobby-Mac had lower proper-usage percentages; and Century, Cosco/Peterson, and Questor-Kantwet (excluding Bobby-Mac) had higher proper-usage percentages.

A summary of the types of improper usage is given in Table 9. The major overall improper usage was not harnessing the child into the safety seat. That was a particular problem for safety seats having an armrest that was used incorrectly in many instances as a replacement for the harness. That was also the major problem for toddlers, followed closely by failure to tether the seat as required. For infants, the major problem involved facing the infant forward rather than in the required backward position. Another major problem for toddlers was failure to use the shield required by some restraints.

The most frequent improper usages for specific models of child safety seats are listed in Table 10. The most frequently

observed child safety seats are included in this table. A problem common to most of the safety seats was failure to harness the child into the seat. Another problem typical of most safety seats was placing an infant in a forward facing position. The most prevalent problems were failure to tether the Strollee and Child Love Seat and failure to use the harness in the "old type" safety seat.

#### DRIVER SAFETY BELT USAGE RATES

Safety belt usage was obtained for over 28,000 drivers as part of the survey. A summary, by city, is provided in Table 11. Counties were divided into categories based upon the number of licensed drivers in each county. As with child safety seat usage, driver safety belt usage was highest in the larger cities. The highest usage rates were observed in Louisville, Lexington, and Covington. The lowest rate was observed in Princeton.

A statewide rate was obtained by weighting the overall percent usage for each category by the percentage of the total driving population in that category. Using that procedure, a statewide driver safety belt usage rate of 5.8 percent was determined. This compares to a national usage rate, quoted by the National Highway Safety Administration, of 13.8 percent for drivers and front-seat passengers.

Equation 1, with a sample size (n) of 28,544, a probability of 0.95, and a proportion (p) of 5.8 percent yielded a bound on the relative error of the proportion (d) of 4.7 percent. When applied to the observed proportion (5.8 percent), this yielded an absolute error of 0.3 percent. Therefore, confidence limits for statewide driver safety belt usage were 5.5 to 6.1 percent.

The usage rate of 5.8 percent compares to a rate of 4.2 percent determined from the "before" survey. This is an increase of about 38 percent, but it still represents very low usage. The increase was statistically significant at the 0.95 level of significance (6).

Relationships between driver age and sex and safety belt usage were investigated and are shown in Table 12. Drivers in the middle-age category had the

highest usage rate. Males and females had very similar rates.

#### SUMMARY

1. A statewide child safety seat usage rate of 22.7 percent was observed one year after enactment of the mandatory usage law. That compares to 14.4 percent usage before passage of the law and represents a statistically significant increase.

2. Proper usage remains a problem with only 50 percent of the child safety seats used properly. That compares to 44 percent proper usage for the "before" survey.

3. Safety seat usage increased in 18 of the 19 cities surveyed. Usage was highest in the larger cities and varied from 43.4 percent in Lexington to 5.7 percent in Lawrenceburg, which was the only city having a decrease in usage.

4. The increase in usage was smallest in the category representing the lowest population category.

5. A small number (1.5 percent) of children were placed in a safety belt rather than a child safety seat. That was an increase from the 1.0 percent found in the "before" survey.

6. Several factors were noted as being related to child safety seat usage. Of particular significance was the high percentage of children in either a safety seat or safety belt (85 percent) when the driver was also restrained (using a safety belt). Usage also was observed to be higher for infants (under one year of age) when compared to toddlers (one through three years of age).

7. About one-fourth of the unrestrained children were observed to be seated in a normal manner. Slightly over 30 percent of front-seat unrestrained children were standing in the seat, which creates a particularly hazardous condition.

8. A few models of safety seats were very popular. The Strollee Wee Care was the most frequently observed model followed by the Questor Kantwet One-Step. Those two models were observed much more

often than any other. Other common seats included the Cosco/Peterson Safe-T-Seat, Bobby-Mac Champion and Deluxe II, Questor Dyn-O-Mite, Century 100, and the Child and Infant Love Seats. Several "old type" restraints, characterized by separate headrests and armrests, also were observed.

9. The major overall improper usage involved failure to harness the child into the safety seat. For toddlers, another major problem was failure to tether the safety seat or use a shield when required. For infants, the major problem involved facing the infant forward rather than in the required backward position.

10. Proper usage varied substantially by model of safety seats. The Strollee and Child Love Seat had low proper usage percentages because of the requirement to tether the seat. The Bobby-Mac seats had a low proper-use percentage because of failure to use the shield with the Champion, Deluxe II, and Two-In-One models in the forward-facing toddler position. A high percentage of children were not harnessed when using the "old type" restraint. Of the common brands, Century, Cosco/Peterson, and Questor Kantwet (excluding Bobby Mac) had the highest proper-use percentages.

11. The statewide driver safety belt usage was 5.8 percent. That compares to 4.2 percent from the "before" survey and represents a statistically significant increase.

12. The increase in usage in child safety seats may be attributed both to enactment of a mandatory usage law and increased educational and promotional campaigns. Driver safety belt usage has increased without benefit of any law and probably because of the increased information available. To obtain maximum benefit from a mandatory usage law, the law needs to be modified as described below.

#### MODIFICATIONS TO CURRENT LAW

As of May 1983, Kentucky is one of 40 states along with the District of Columbia that has some sort of child restraint law.

While passage of such a law in Kentucky has proven to be a positive step, there are certain modifications that should be made to improve the law. A recent National Safety Council Policy Update summarized the major components of the 41 current laws (7). A review of the paper along with a guide for state legislation published by Physicians for Automotive Safety (8) pointed out several potential modifications. The modifications apply to four general areas. Following is a discussion of those areas.

### 1. DEFINING TO WHOM THE LAW APPLIES

Kentucky's law applies to children 40 inches or less in height. None of the other laws use height as a criterion for defining which children must use a child safety seat. All other laws use age as a criterion and four use weight (40 pounds) as an additional criterion. The most common age criteria used was less than four years with 20 of the 40 listing this as the criteria. The next most commonly used cutoff point was less than five years with 12 laws using that age. Three laws listed less than six or less than three while two listed less than two.

In June 1983, New York amended their law, raising the age to which their law applies. Effective April 1984, their new law requires children between four and seven to be restrained in safety belts. This age requirement for safety belt use will then be raised one year per year until April 1987, when all children age four through nine must be restrained.

Kentucky's law should be in conformance with other laws and use age as the method of defining to whom the law applies. A logical criterion would be that the law should apply to all pre-school children. Therefore, the law should apply to children less than five, or preferably six, years in age. That age requirement would be in conjunction with a safety belt substitution provision.

### 2. SAFETY BELT SUBSTITUTION

All but ten of the 41 existing laws have a provision for safety belt substitution (7). More states are including the provision (17 of the 20

states with new laws in 1983). Although properly used child safety seats provide more protection for small children than safety belts, safety belts provide an alternative means of protection when safety seats are not available.

Twenty of the 40 states allow belts to be substituted for safety seats after a certain age. The age varies with approximately one-third specifying over one year of age and another one-third stating over three years of age. Another limitation placed by a few other states is that safety belts be substituted in the rear seat only.

If Kentucky's law applied to children under the age of six, safety belts should be allowed as a substitute for children between the ages of three and six. Also, safety belts should be allowed as a substitute for children who have outgrown the height or weight limits of their child safety seat. Those limits are typically about 40 inches or 40 pounds except for restraint systems such as Century Safe-T-Rider or Collier Keyworth Co-Pilot, which could accommodate children even beyond six years of age. The average child outgrows those limits between the ages of four and five. Only about five percent of children exceed these limits at the age of three; approximately 25 percent exceed the limits at the age of four.

A safety belt substitution provision (primarily for four- and five-year olds) would serve as a transition after the use of child safety seats. After a child outgrows a safety seat, no type of restraint is typically used. If the child is required to use a safety belt for a period of time, that habit may continue in later years. Also, data indicate that increasing safety belt usage by children will result in increased use of safety belts by the driver.

### 3. PENALTY

Kentucky's current law does not provide for penalty, other than a possible warning citation, for not adhering to the law. Only 4 of the 41 current laws do not provide a fine for failure to obey the law. The most common fine is \$25, and that is also about the average fine. Many

laws provide for a range in possible fines. The minimum lower limit is \$2 while the highest upper limit is \$500. Only five laws provided for a maximum fine of over \$50.

All but six laws have a provision for waiving the fine. That would typically occur when proof was presented that a child safety seat was obtained. Some laws allowed the fine to be waived only when it was the first offense.

It is apparent that a penalty should be associated with Kentucky's law. However, the fine should not be excessive. A fine of not less than \$15 nor more than \$25 (exclusive of court costs) would appear appropriate, and the fine should be waived for the first offense upon proof that a child safety seat was obtained.

A few of the laws specify that fine revenues be used to implement a loaner program or educational programs. Designating the fine revenue to be used to establish a fund to purchase child safety seats for a loaner program for qualifying needy people appears to be a suitable use for the money.

#### 4. EXEMPTIONS

Kentucky's law exempts recreational vehicles or trucks having a tonnage rating of more than one ton. The most common other exemption, which was listed in nine laws, involves the situation where there are more children in the vehicle than seating positions. Another exemption, which was listed in six laws, involves attending to the personal needs of a child. Other exemptions mentioned in at least one law included car pools, taxis, rental vehicles, vehicles not equipped with safety belts, children physically unable to use restraints, buses weighing more than one ton, trucks, emergency vehicles, and recreational vehicles.

Care should be exercised not to make unnecessary exemptions. However, for the law to be viewed by the public as fair, exemptions should be made where appropriate. Therefore, other exemptions should be considered as part of Kentucky's law. The law should exempt vehicles not equipped with safety belts or not required to have safety belts. An exemption should

be made for vehicles in which the number of people exceeds the number of seating positions; however, all safety belts should be in use and unrestrained children should be in the rear seat. Children physically unable to use a child safety seat should be exempted when proof is provided by a physician's statement.

#### RECOMMENDATIONS

While usage of child safety seats has increased significantly in the year after enactment of a mandatory law, usage remains low. Additional efforts to increase usage are warranted. Educational and promotional campaigns should be continued and increased in areas identified as having particularly low usage rates.

The existing law should be modified to strengthen its influence on usage. Modifications and additions in the following four areas are recommended for Kentucky's child safety seat law:

1. Age - Children under the age of six should be required to be properly secured in a child restraint system.

2. Safety belt substitution - Safety belts may be substituted for child safety seats for children between the ages of three and six and for children who have outgrown the height or weight limits of their child safety seat.

3. Penalty - Any person violating the law should be fined not less than \$15 nor more than \$25 (exclusive of court costs). The fine would be waived for the first offense upon proof that a child safety seat was obtained. The fine revenue should be used to establish a fund for the purchase of child safety seats to be loaned to qualifying families.

4. Exemptions - Vehicles not equipped or required to be equipped with safety belts should be exempted. Also, vehicles in which the number of people exceeds the number of seating positions should be exempted with the provision that all safety belts be in use and unrestrained children be placed in the rear seat. Children physically unable to use a child safety seat should be exempted when a

physician's statement is provided.

The problem of improper usage continues. This aspect should be emphasized in the educational and promotional campaigns. Consequences of improper usage should be documented as part of an in-depth study of accidents involving children in a child safety seat or safety belt. Such a study also should compare the effectiveness of child safety seats and safety belts for children of various ages.

To maintain up-to-date usage statistics and determine the effect of new educational and promotional campaigns and any modifications to the existing law, another observational study should be conducted in 1984. Cities used in this study should be included as well as cities in counties where intensive promotional campaigns have been implemented.

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TABLE 1. LISTING OF AVAILABLE CHILD SAFETY SEATS\*

MANUFACTURER	MODEL	DESCRIPTION	
Cosco/Peterson	Safe-T-Shield	Convertible; three-point harness for infants; shield only for toddlers	
	Safe-T-Seat	Convertible, five-point harness	
	Safe and Easy	Convertible, five-point harness	
	Safe and Snug	Convertible, combination shield and harness system	
	First Ride Travel Hi-Lo	Infants only; Y-harness Children to 65 lbs.; lap and shoulder belt in front seat, belt and tethered body harness in rear	
	Deluxe Travel Hi-Lo	Children to 65 lbs.; backrest and three-point harness	
	Century	Century 100 Century 200 Century 300 Infant Love Seat Child Love Seat Safe-T-Rider Trav-l-guard	Convertible; five-point harness Convertible; combination shield and harness system Convertible; five-point harness with armrest Infants only; Y-harness Toddlers only; five-point harness, tether required Toddlers and children to 10 years; lap and shoulder belt in front seat, lap belt and tethered body harness in rear seat Convertible; five-point harness with armrest
Wee Care	Wee Care Wee Care Booster Seat	Convertible; five-point harness with armrest; tether required Children to 70 lbs.; auto lap and shoulder belt in front seat, auto lap belt with tethered harness in rear seat	
	Questor Kantwet	Byn-O-Mite One-Step Care Seat Safe Guard Bobby Mac Champion Bobby Mac Deluxe II Bobby Mac Super	Infants only; Y-harness Convertible; combination shield and harness system Convertible; five-point harness Convertible; five-point harness Convertible; five-point harness for infant, add shield for toddler Convertible; three-point harness for infant, add swing-down shield for toddler Convertible; five-point harness, tether required
International	Astroseat (9300) Astroseat (9100) Astrorider	Convertible; five-point harness Convertible; combination shield and harness system Children to 55 lbs.; used with adult three-point belt system or adult lap belt with harness	
Kolcraft	Hi-Rider Hi-Rider XL Tot-Rider Tot-Rider XL Redi-Rider (17430) Redi-Rider (19530)	Convertible; five-point harness, optional shield Convertible; five-point harness with armrest Toddlers and children to 10 yrs.; lap and shoulder belt in front seat, lap belt and tethered body harness in rear Toddlers and children to 10 yrs.; lap and shoulder belt in front seat, harness system in rear Convertible; five-point harness Convertible; combination shield and harness system	
	Ford	Tot Guard	Toddlers only; shield only
	General Motors	Infant Love Seat Child Love Seat	Infants only; Y-harness Toddlers only; five-point harness, tether required
	Welsh	Travel Tot	Convertible five-point harness with shield
	Collier-Keyworth	Safe and Sound Co-Pilot	Convertible; combination shield and harness system Toddlers and children; full protective shield
Pride Trimble	Pride Ride (820) Pride Ride (830)	Convertible; five-point harness Convertible; five-point harness with armrest	

\*Convertible restraints can be used by infants and toddler, infants in a rear-facing position and toddlers in a forward-facing position. Tethers, where required, are for toddler position only.



TABLE 2. DISTRIBUTION OF SAMPLE

COUNTY POPULATION CATEGORY (NUMBER OF CHILDREN UNDER FIVE YEARS OLD)	PERCENTAGE OF STATEWIDE TOTAL	SAMPLE SIZE	SURVEY COUNTIES	SURVEY CITIES
10,000 or More	26.6	1,330	Fayette Jefferson Kenton	Lexington Louisville Covington
5,000-9,999	14.0	700	Campbell Christian Hardin	Newport Hopkinsville Elizabethtown
2,500-4,999	23.3	1,165	Franklin Henderson Hopkins Perry Pulaski	Frankfort Henderson Madisonville Hazard Somerset
1,000-2,499	26.0	1,300	Barren Clark Mason Nelson Rowan	Glasgow Winchester Maysville Bardstown Morehead
Under 1,000	10.1	505	Anderson Caldwell Carroll	Lawrenceburg Princeton Carrollton

TABLE 3. STATEWIDE USAGE OF CHILD SAFETY SEATS

COUNTY POPULATION CATEGORY (NUMBER OF CHILDREN UNDER FIVE YEARS OLD)	SAMPLE SIZE	NUMBER USING CHILD SAFETY SEAT	PERCENT USING CHILD SAFETY SEAT	PERCENT OF CHILD SAFETY SEATS USED PROPERLY	NUMBER USING SAFETY BELT	PERCENT USING SAFETY BELT	PERCENT USING ANY RESTRAINT
10,000 or more	1,330	498	37.4	50	39	2.9	41.1
5,000-9,999	700	169	24.1	44	6	0.9	25.0
2,500-4,999	1,165	220	18.9	55	12	1.0	19.9
1,000-2,499	1,300	208	16.0	53	10	0.8	16.8
Under 1,000	505	41	8.1	39	7	1.4	9.5
A11	5,000	1,136	22.7	50	74	1.5	24.2

TABLE 4. USAGE OF CHILD SAFETY SEATS BY CITY

CITY	POPULATION	SAMPLE SIZE	NUMBER USING CHILD SAFETY SEAT	PERCENT USING CHILD SAFETY SEAT	PERCENT OF CHILD SAFETY SEATS USED PROPERLY	NUMBER USING SAFETY BELT	PERCENT USING SAFETY BELT	PERCENT USING ANY RESTRAINT
Louisville	298,451	546	182	33.3	60	16	2.9	36.3
Lexington	204,165	507	220	43.4	40	12	2.4	45.8
Covington	49,013	277	96	34.7	50	11	4.0	38.6
Hopkinsville	27,318	178	32	18.0	31	2	1.1	19.1
Frankfort	25,973	293	74	25.3	55	2	0.7	25.9
Henderson	24,834	200	37	18.5	43	0	0.0	18.5
Newport	21,587	237	64	27.0	52	1	0.4	27.4
Madisonville	16,979	201	33	16.4	58	4	2.0	18.4
Elizabethtown	15,380	285	73	25.6	42	3	1.1	26.7
Winchester	15,216	353	47	13.3	60	2	0.6	13.9
Glasgow	12,958	151	22	14.6	64	3	2.0	16.6
Somerset	10,649	270	57	21.1	61	6	2.2	23.3
Maysville	7,982	280	47	16.8	60	4	1.4	18.2
Morehead	7,789	226	32	14.1	38	0	0.0	14.1
Princeton	7,073	171	18	10.5	28	2	1.2	11.7
Bardstown	6,155	290	60	20.7	48	1	0.3	21.0
Hazard	5,429	201	19	9.5	47	0	0.0	9.5
Lawrenceburg	5,167	158	9	5.7	33	1	0.6	6.3
Carrollton	3,967	176	14	8.0	57	4	2.3	10.2

TABLE 5. COMPARISON OF CHILD SAFETY SEAT USAGE BEFORE AND AFTER MANDATORY USAGE LAW

CITY	PERCENT USING CHILD SAFETY SEAT		PERCENT CHANGE	STATISTICALLY SIGNIFICANT*
	BEFORE	AFTER		
Louisville	20.0	33.3	66	Yes
Lexington	29.8	43.4	46	Yes
Covington	19.1	34.7	82	Yes
Hopkinsville	10.7	18.0	68	No
Frankfort	14.0	25.3	81	Yes
Henderson	13.5	18.5	37	No
Newport	10.1	27.4	171	Yes
Madisonville	12.4	16.4	32	No
Elizabethtown	10.5	25.6	144	Yes
Winchester	11.0	13.3	21	No
Glasgow	13.9	14.6	5	No
Somerset	7.0	21.1	201	Yes
Maysville	11.4	16.8	47	Yes
Morehead	9.7	14.1	45	No
Princeton	9.9	10.5	6	No
Bardstown	18.6	20.7	11	No
Hazard	6.5	9.5	32	No
Lawrenceburg	7.0	5.7	-19	No
Carrollton	6.3	8.0	28	No
All	14.4	22.7	58	Yes

\*Level of statistical significance of 0.95

TABLE 6. VARIOUS FACTORS AFFECTING CHILD SAFETY SEAT USAGE

VARIABLE	CATEGORY	SAMPLE SIZE	PERCENT USING CHILD SAFETY SEATS	PERCENT OF CHILD SAFETY SEATS USED PROPERLY	PERCENT USING SAFETY BELTS
Number of Children Under Four in Car	1	3,767	24.3	50	1.5
	2	1,105	18.8	49	1.5
	3 or More	128	11.7	33	1.6
Age (Years)	Less Than 1	831	41.0	52	0.0
	1-3	4,169	19.1	49	1.8
Child's Location	Front	2,522	13.7	55	1.5
	Rear	2,409	32.8	48	1.5
Driver Sex	M	1,297	15.6	49	1.0
	F	3,696	25.2	50	1.7
Driver Age	Y*	1,948	22.4	49	1.0
	M	2,881	23.9	50	1.9
	O	164	6.1	60	0.0
Driver Restrained	Yes	230	65.2	65	19.6
	No	4,751	20.6	48	0.6

\*Y -- 16-30 years M -- 31-50 years O -- 51 years or older

TABLE 7. SEATING POSITIONS OF UNRESTRAINED CHILDREN

SEATING POSITION	NUMBER	PERCENT
Seated in a Normal Manner	865	23.1
On Lap	752	20.1
In Cargo Area	69	1.8
Other*	2,055	55.0

\*Primarily standing on the seat or sitting on the front edge of the seat

TABLE 8. USAGE OF VARIOUS TYPES OF CHILD RESTRAINTS

CHILD RESTRAINT	ALL CHILDREN		INFANTS ONLY		TODDLERS ONLY	
	NUMBER OBSERVED	PERCENT PROPERLY USED	NUMBER OBSERVED	PERCENT PROPERLY USED	NUMBER OBSERVED	PERCENT PROPERLY USED
Questor Kantwet	366	63	144	64	222	63
One-Step	159	86	52	69	107	94
Dyn-O-Mite	45	73	45	73	0	DNA
Care Seat	10	40	2	50	8	38
Safe Guard	2	0	0	DNA	2	0
Bobby-Mac						
Champion	49	37	11	45	38	34
Deluxe II	43	30	10	40	33	27
Two-in One	18	33	5	40	13	31
Super	14	36	6	20	8	50
Unclassified	26	58	13	69	13	46
Strolee Wee Care	216	19	38	24	178	18
Century	140	81	38	66	102	78
100	44	73	12	75	32	72
200	30	80	5	40	25	88
300	33	70	11	64	22	73
Tray-1-guard	15	60	3	33	12	67
Unclassified	18	94	7	86	11	100
Cosco/Peterson	122	68	50	54	72	78
Safe-T-Seat	67	67	33	64	34	71
Safe and Snug	25	80	8	50	17	94
Safe-T-Shield	17	76	2	50	15	80
First Ride	5	20	5	20	0	DNA
Safe and Easy	4	100	0	DNA	4	100
Peterson	4	0	2	0	2	0
Old Type*	97	13	18	17	79	13
Unknown Type	37	43	11	36	26	46
Child Love Seat	48	21	0	DNA	48	21
Infant Love Seat	34	35	33	36	1	0
International						
Astroseat	18	78	6	67	12	83
Booster Seat	18	50	0	DNA	18	50
Kolcraft	16	81	3	100	13	77
Hi-Rider	7	100	3	100	4	100
Redi-Rider	9	67	0	DNA	9	67
Collier Keyworth	13	85	2	50	11	91
Safe and Sound	6	67	2	50	4	75
Co-Pilot	7	100	0	DNA	7	100
Graco	6	100	0	DNA	6	100
Welsh	2	100	0	DNA	2	100
Pride Trimble	2	50	0	DNA	2	50
Ford Tot-Guard	1	100	0	DNA	1	100

\*Seat not currently available. Has armrest and separate headrest.  
Made by more than one manufacturer.

TABLE 9. MAJOR REASONS FOR IMPROPER USAGE

REASON	NUMBER WITH GIVEN REASON		
	ALL CHILDREN	INFANTS	TODDLERS
Child Not Harnessed as Required	276	58	218
Restraint Not Tethered as Required	192	11	181
Infant Facing Forward	110	110	0
Shield Not Used as Required	67	0	67
Restraint Not Belted to Car	5	5	0

TABLE 10. MOST FREQUENT IMPROPER USAGE FOR COMMON CHILD RESTRAINTS

RESTRAINT TYPE	TYPE OF MISUSE	PERCENT MISUSED FOR GIVEN REASON
Old Type	Not Harnessed	86
Strolee	Seat Not Tethered	68
	Not Harnessed	21
	Infant Facing Forward	12
Child Love Seat	Seat Not Tethered	73
	Not Harnessed	31
Infant Love Seat	Infant Facing Forward	38
	Not Harnessed	35
Bobby-Mac	Shield Not Used	48
	Not Harnessed	22
	Infant Facing Forward	9
Century	Not Harnessed	19
Cosco/Peterson	Not Harnessed	18
	Infant Facing Forward	11
Questor Dyn-0-Mite	Not Harnessed	13
	Infant Facing Forward	9
Kantwet One-Step	Infant Facing Forward	9

TABLE 11. DRIVER SAFETY BELT USAGE RATES

COUNTY POPULATION CATEGORY (NUMBER OF LICENSED DRIVERS)	NUMBER OF COUNTIES IN CATEGORY	PERCENTAGE OF STATEWIDE DRIVING POPULATION	SURVEY COUNTIES	SURVEY CITIES	SAMPLE SIZE	PERCENT DRIVERS USING SAFETY BELTS	OVERALL PERCENT USAGE BY CATEGORY
Over 75,000	3	30.0	Jefferson	Louisville	3,866	11.9	10.7
			Fayette	Lexington	2,979	10.1	
			Kenton	Covington	1,921	9.3	
30,001-75,000	9	17.0	Campbell	Newport	1,315	6.4	4.3
			Hardin	Elizabethtown	1,241	3.5	
			Christian	Hopkinsville	1,282	3.0	
20,001-30,000	13	14.6	Hopkins	Madisonville	1,233	2.8	4.6
			Henderson	Henderson	1,008	4.6	
			Franklin	Frankfort	1,904	7.1	
			Pulaski	Somerset	815	3.6	
			Barren	Glasgow	948	2.8	
10,001-20,000	32	20.0	Clark	Winchester	2,099	2.9	3.2
			Nelson	Bardstown	1,220	4.1	
			Perry	Hazard	1,068	2.7	
			Mason	Maysville	1,476	3.3	
			Rowan	Morehead	1,302	3.2	
Under 10,001	63	18.4	Caldwell	Princeton	1,265	1.7	2.9
			Anderson	Lawrenceburg	824	2.3	
			Carroll	Carrollton	778	4.9	

TABLE 12. DRIVER SAFETY BELT USAGE RATES BY AGE AND SEX

SEX	AGE*	PERCENT USING SAFETY BELTS
Male	Young	5.3
	Middle-Age	6.9
	Older	5.8
	All	6.0
Female	Young	5.4
	Middle-Age	6.3
	Older	5.4
	All	6.1
Male or Female	Young	5.3
	Middle-Age	6.5
	Older	5.6

\*Age was estimated as given in Figure 2.





Figure 2. Data Collection Coding Instructions.\*

1. General Information:

DATE --Date of Data Collection  
TIME --Time Data Sheet Started  
CITY --City Where Data Collected  
LOCATION --Intersection Where Data Collected  
COMMENTS --Relevant Comments Concerning Data

2. Data for Cars Containing Children under Four:

NO. CH. --Number of Children under Four in Vehicle  
Record Once for Each Vehicle  
AGE --Check Best Estimate of Child's Age  
RESTRAINT --Check Appropriate Code  
N -- None  
B -- Belt Only  
H -- Harness and Belt  
CR -- Child Restraint (Safety Seat)

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CHILD RESTRAINT

TYPE -- Brand and Model (e.g., Kantwet One-Step)  
P-I -- Check Whether Properly (P) or  
Improperly (I) Used  
REASON -- If Improperly Used, Give Explanation  
(e.g., Not Tethered)  
POSITION -- Check One in Two Categories  
1. F - Front Seat  
R - Rear Seat  
C - Cargo Area (Station Wagon)  
Do Not Check Following Category if Child  
Restraint Used  
2. S - Seated in a Normal Manner  
L - Held in Lap  
O - Other (e.g., Standing or Sitting on  
Front Edge of Seat)

DRIVER -- Check One in Three Categories

1. N - No Restraint  
B - Belt only  
H - Harness and Belt  
2. M - Male  
F - Female  
3. Y - Young (16 - 30 Years)  
M - Middle (31-50 Years)  
O - Older (51 or More)

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3. Data for Drivers of Other Vehicles

For Each Driver, Determine Restraint Usage and Place a  
Mark in the Appropriate Age and Sex Category.  
Put Maximum of Ten Marks in a Given Space.

\* When data have been recorded for ten children or when  
fifty drivers are recorded in any single category, it  
will be necessary to start a new sheet.



APPENDIX

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KENTUCKY'S CHILD SAFETY SEAT LAW

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AN ACT relating to traffic safety.

Be it enacted by the General Assembly of the Commonwealth of Kentucky:

Section 1. KRS 189.125 is amended to read as follows:

(1) No person shall sell any new passenger vehicle in this state nor shall any person make application for registering a new passenger vehicle in this state unless the front or forward seat or seats have adequate anchors or attachments secured to the floor and/or sides to the rear of the seat or seats to which seat belts may be secured.

(2) Any resident parent or legal guardian of a child, forty inches (40") in height or less, when transporting his child in a motor vehicle owned by that parent or guardian operated on the roadways, streets and highways of this state, shall have such child properly secured in a child restraint system of a type meeting federal motor vehicle safety standards.

(3) As used in this section, "child restraint system" means any device manufactured to transport children in a motor vehicle which conforms to all applicable federal motor vehicle safety standards.

(4) The term "motor vehicle" as used in subsection (2) of this Act shall not apply to recreational vehicles or trucks having a tonnage rating of more than one (1) ton.

(5) Failure to wear a child passenger restraint shall not be considered as contributory negligence, nor shall such failure to wear said passenger restraint system be admissible as evidence in the trial of any civil action.

(6) KRS 189.990 and 189.993 to the contrary notwithstanding, there shall be no penalty for the violation of this section. No peace officer shall issue a uniform citation or any other citation, other than a warning, for a violation of this section nor shall any arrest be permitted for violation of this section.

