1990 Survey of Child Restraint Use in Fourteen Texas Cities

by

Katie N. Womack

August 1990
Final Report

This report was prepared in cooperation with the

Maintenance and Operations Division
State Department of Highways and Public Transportation
Tonna Polk, Project Manager

National Highway Traffic Safety Administration
U.S. Department of Transportation

The Texas Transportation Institute
The Texas A&M University System
College Station, Texas

DISCLAIMER

"The conclusions and opinions expressed in this document are those of the authors, and do not necessarily represent those of the State of Texas, the State Department of Highways and Public Transportation or any political subdivision of the State or Federal Government."

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1990 Survey of Child Restraint Use in Fourteen Texas Cities

Background

Beginning in 1983, Texas Transportation Institute (TTI) collected observational data on the use of child restraints in a sample of Texas cities for the Texas State Department of Highways and Public Transportation (SDHPT). At that time, Texas was still without any type of child passenger safety law. However, child passenger safety legislation was passed in the 1984 session of the Texas Legislature. The law went into effect without sanctions on October 1, 1984; enforcement with the imposition of $25-$50 fines began on January 1, 1985. In order to assess expected changes in child restraint use after passage of the law, TTI has collected follow-up data since 1985. This report presents the results of the 1990 survey, and compares these findings to the results of the earlier surveys.

Survey Methodology

The survey methodology is described in detail in previous TTI reports (Kugle, et al., 1985; Hatfield, et al., 1986). A sample of eleven Texas cities was initially surveyed to assess pre-law child restraint use. In 1985 El Paso was added to the sample, and in 1988 Beaumont and Fort Worth were added to the sample. During the week of March 12-16, 1990, data were collected for each of the following 14 cities:

child safety seat or an adult lap belt. An additional 5.3 percent were observed to be restrained, but in an incorrect and unsafe manner. The remainder of the children in the total sample, 46.6 percent, were found to be riding unrestrained (6.4 percent held on laps), despite the legal mandate (Table 1). In 199 cases where a child was riding unrestrained, an unused child safety seat was observed in the vehicle. Almost all of these vehicles with unused safety seats were cars rather than pickups (195 cars and 4 pickups).

When the observations were examined by type of observation site, restraint use was found to be higher at day care centers than at shopping centers. Approximately 61 percent of the children observed at day care centers were observed to be riding restrained in some manner, while 48 percent of the children observed at shopping centers were restrained (Table 2).

Analysis by vehicle type (car versus pickup truck) showed that children were much more likely to be riding unrestrained in pickups. While 45.4 percent of the children in cars were not restrained by any system, 60.1 percent of the child passengers of pickups were not restrained (Table 3).

An analysis by individual city revealed that the percentage of correct child restraint use in the 14 cities varied from a high of 66 percent in Austin to a low of 20.5 percent in Brownsville. Incorrect restraint use varied from 2.3 percent to 12.8 percent across the study areas (Table 4). A breakdown of observed usage rates at day care centers and shopping centers for individual cities revealed that only in Corpus Christi was the proportion of

Table 1. Observed Child Restraint Use in the Combined Texas Sample (1990) (n = 15,132)

Restraint Use	Frequency	Percent
Correctly Restrained:		
Correct use of child safety seat	3205	21.2
Correct use of adult lap belt	4074	26.9
Total	7279	48.1
Incorrectly Restrained:		
Incorrect use of child safety seat	486	3.2
Incorrect use of adult lap belt	231	1.5
Unsafe child seat	82	.6
Total	799	5.3
Unrestrained:		
No restraint	6087	40.2
Child held on lap	967	6.4
Total	7054	46.6

Table 3. Child Restraint Use by Type of Vehicle

	Vehicle Type			
	Car		Pickup	
	Frequency	(%)	Frequency	(%)
Correctly Restrained	6841	(49.3)	438	(34.7)
Incorrectly Restrained	733	(5.3)	66	(5.2)
Unrestrained	6294	(45.4)	760	(60.1)
Total	13868	(100.0)	1264	(100.0)

Table 4. Observed Child Restraint Use in 14 Texas Cities

City	Percent Restraint Use		
	Correctly Restrained	Incorrectly Restrained	Unrestrained
Amarillo	41.0	2.8	56.2
Austin	65.9	6.4	27.7
Beaumont	57.0	3.2	39.8
Brownsville	20.5	4.8	74.7
Bryan/College Station	58.3	9.3	32.4
Corpus Christi	52.9	3.2	43.9
Dallas	44.0	5.4	50.6
El Paso	55.0	2.3	42.7
Fort Worth	52.6	12.8	34.6
Houston	37.8	6.4	55.8
Lubbock	45.2	5.4	49.4
San Antonio	41.1	5.0	53.9
Tyler	59.6	4.4	36.0
Waco	43.0	3.0	54.0

observed unrestrained children at day care centers higher than or equal to the proportion observed unrestrained at shopping centers. In all other cities surveyed, usage observed at day care centers was consistently higher than that observed at shopping centers (Tables 5 and 6). Incorrect restraint use was observed more frequently at day care centers than at shopping center sites in all cities except Corpus Christi. This is very likely to be a result of the observation technique, which allowed for greater scrutiny at the day care center sites during drop-off and pick-up times.

Trend Analyses

This section of the analysis compares child restraint use over the seven years for which data has been collected. Percentages restrained at child care centers and shopping centers were contrasted and changes across time were examined. An assumption was made that the use of restraints for each child when two or more were riding in the same vehicle was not independent. In other words, restraint use for one child would influence whether or not a restraint was used for any or all of the other child passengers. Due to this assumed dependency of restraint use among multiple child passengers, the major statistical analyses were carried out using observations on vehicles with a single child occupant.

In this analysis, the reported percentages for restrained children include both correctly and incorrectly restrained. Combining correctly and incorrectly restrained proportions helps to eliminate any bias that may have been introduced due to problems associated with accurately assessing examples of misuse. As was

Table 5. Observed Child Restraint Use at Day Care Centers in 14 Texas Cities

City	(Number Observed)	Percent Restraint Use: Correctly Restrained	Incorrectly Restrained	Unrestrained
Amarillo	(305)	44.9	4.3	50.8
Austin	(264)	70.8	12.5	16.7
Beaumont	(367)	66.8	4.9	28.3
Brownsville	(190)	40.0	12.6	47.4
Bryan/College Station	(503)	59.6	13.1	27.3
Corpus Christi	(613)	52.7	2.6	44.7
Dallas	(428)	46.7	8.4	44.9
El Paso	(551)	57.5	3.3	39.2
Fort Worth	(495)	58.8	15.1	26.1
Houston	(668)	42.7	7.5	49.8
Lubbock	(443)	55.1	9.0	35.9
San Antonio	(467)	40.7	6.8	52.5
Tyler	(582)	63.9	7.9	28.2
Waco	(659)	47.9	4.6	47.5

Table 6. Observed Child Restraint Use at Shopping Centers in 14 Texas Cities

City	(Number Observed)	Percent Restraint Use: Correctly Restrained	Incorrectly Restrained	Unrestrained
Amarillo	(666)	39.2	2.1	58.7
Austin	(599)	63.8	3.7	32.5
Beaumont	(590)	50.8	2.2	47.0
Brownsville	(605)	14.4	2.3	83.3
Bryan/College Station	(407)	56.5	4.7	38.8
Corpus Christi	(506)	53.2	3.9	42.9
Dallas	(771)	42.5	3.8	53.7
El Paso	(600)	52.7	1.3	46.0
Fort Worth	(598)	47.5	10.9	41.6
Houston	(804)	33.7	5.5	60.8
Lubbock	(690)	38.9	3.0	58.1
San Antonio	(504)	41.5	3.4	55.1
Tyler	(652)	55.7	1.2	43.1
Waco	(605)	37.7	1.3	61.0

explained in the 1985 report, instances of misuse included in this data set were limited to those that were obvious to the observers without prolonged inspection and, thus, represent a very conservative estimate of actual misuse. This was particularly true at shopping centers where cars did not always stop at the observation points. By combining correct and incorrect proportions into a broader category of overall restraint use, observer bias is reduced considerably.

As shown in Table 7, between 1984 and 1985, overall restraint use increased by at least 50 percent in all study cities except Austin, where baseline usage rates had been extremely high relative to those observed in the other sample cities. In four of the study areas, child restraint use more than doubled in that same time period. These changes, which occurred coincident with the implementation of the child passenger safety law in Texas, were consistent with the experiences noted in other states at the time legislation was put into effect. What occurred between 1985 and 1986, however, represented more than just the transition from the first year to the second year of enforcement. The mandatory safety belt use law (MUL) in Texas went into effect on September 1, 1985; thus, observed child restraint usage rates in 1986 were probably affected by the new legislation requiring the use of safety belts by adults in this State. In 1987 child restraint use dropped in every survey city except Corpus Christi. By 1987 the safety belt use law was in its second year of effect and restraint use in general had declined somewhat (Womack, et al., 1987). Other studies have documented a strong relationship between drivers' use

Table 7. Observed Percentage of Restraint In Vehicles With One Child Occupant by City Over Time[a]

City	Before Law Was Passed	After Law Was Passed					
	1984	1985[b]	1986[b]	1987[c]	1988[c]	1989[c]	1990[c]
Amarillo	18.1	38.9	64.0	49.3	56.3	37.3	45.9
Austin	45.0	60.9	75.7	73.9	70.6	76.5	74.4
Beaumont	NA	NA	NA	NA	60.6	50.8	67.8
Brownsville	8.3	15.6	50.9	17.2	13.9	19.3	27.2
Bryan/CS	33.6	51.3	73.8	62.2	63.1	62.9	69.8
Corpus Christi	18.3	33.6	51.8	61.3	53.3	62.5	58.2
Dallas	28.2	49.8	65.5	52.9	55.7	62.7	53.1
El Paso	NA	35.6	60.0	54.3	57.2	52.8	59.9
Ft. Worth	NA	NA	NA	NA	63.3	63.8	68.5
Houston	24.3	44.4	60.3	56.7	52.1	48.5	45.5
Lubbock	20.2	47.4	65.4	59.7	53.6	54.4	53.2
San Antonio	20.4	53.0	61.9	58.7	43.5	42.5	47.6
Tyler	20.0	49.7	68.1	55.5	58.0	65.0	66.5
Waco	23.1	42.1	59.8	48.2	52.8	48.4	50.4

[a]Percentages reflect correct and incorrect restraint.
[b]Includes day care centers matched with pre-law survey only.
[c]Includes all day care centers surveyed.

of seat belts and their use of child restraints for their children (Kernish, et al., 1986). The combined average driver belt use in January of 1987 for the same 12 cities of the child restraint survey was 59.5 percent, compared to the average for child restraint use of 54.2 percent in March.

While child restraint use in 1987 decreased in all the survey cities except Corpus Christi, more fluctuation across cities was evidenced in 1988. In 1988, Amarillo showed an increase in use; San Antonio, Houston, Lubbock, and Corpus Christi showed decreases. A trend toward increased child restraint use was observed in 1989 in eight of 12 study cities. This trend continued for six cities in 1990 (Z-test of significance, $p<.05$). Amarillo, Beaumont, Brownsville, Bryan/College Station, El Paso, and Fort Worth all showed significant increases over 1989. A significant decrease in child restraint use was observed in Dallas. Child restraint use in the remaining six study cities did not change significantly.

The analysis of multiple child passengers was conducted in a slightly different manner, due to the lack of independence of observations on children within the same vehicle. A comparison was made between the proportions of vehicles with all of the child passengers restrained, none restrained, or at least one but not every child in the vehicle restrained. As shown in Table 8, very little change has been observed in the percentages of vehicles in which all, some, or none of the children riding in a single vehicle were restrained (Z-test of significance, $p<.01$). A slight but not statistically significant increase in the number of vehicles with no children restrained was observed at day care centers.

Table 8. Percentages of Vehicles With All, Some, or None of the Child Occupants Restrained* by Type of Center and Time Period

	TIME PERIOD						
	Before Law	After Law					
Day Care Centers	1984	1985	1986	1987	1988	1989	1990
(n)	(716)	(556)	(575)	(903)	(1024)	(1033)	(883)
All	14.1	36.5	50.0	45.4	44.2	43.4	46.1
Some	14.4	16.7	18.3	14.5	18.8	17.2	18.7
None	71.5	46.8	31.7	40.1	37.0	39.4	35.2
Shopping Centers							
(n)	(994)	(908)	(686)	(1371)	(1125)	(1042)	(908)
All	11.7	28.1	39.9	30.9	34.6	33.2	29.7
Some	10.8	13.7	20.1	13.6	10.9	14.8	14.6
None	77.6	58.3	39.9	55.4	54.5	52.0	55.7
Combined							
(n)	(1710)	(1464)	(1261)	(2274)	(2149)	(2075)	(1791)
All	12.7	31.3	44.6	36.7	39.2	38.3	37.8
Some	12.3	14.8	19.3	14.0	14.6	16.0	16.6
None	75.0	53.9	36.2	49.3	46.2	45.7	45.6

[a]Percentages reflect correct and incorrect restraint. Excludes data from Beaumont and Ft. Worth.
[b]Includes day care centers matched with pre-law survey only.
[c]Includes all sites surveyed.

Conversely, a slight but not statistically significant decrease in the number of vehicles with no children restrained was observed at shopping centers. The overall combined effect from all observations in 1990 showed no statistical change from 1989 in the proportion of vehicles where all children were restrained or the proportion where no children were restrained, or the proportion where some, but not all children were restrained.

Table 9 shows percentages of child restraint use for each city over time, without controlling for the effect of multiple child passenger dependence. In other words, the percentages provided in Table 9 are for every child observed in each survey. When all observations are considered, the results indicate that the total average across all cities increased significantly during the two years in which restraint legislation was being implemented. However, a significant decline in total child restraint use was evidenced in 1987. During the two-year period following (1988 and 1989), child restraint use overall, did not change to a statistically significant degree ($p<.01$). The current survey (1990) revealed the first significant increase in child restraint use since 1986.

Results of Monthly Observations in Austin, Texas

TTI began to collect monthly data on child restraint use in Austin, Texas in October of 1984, and observations continued through April of 1990. These data provide additional information on changes in observed child restraint use to supplement the data collected in the 14-city surveys.

Table 9. Observed Child Restraint Use by City Over Time*

City	Year						
	1984	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**
Amarillo	16.5	35.9	60.3	38.8	49.6	32.1	43.8
Austin	40.6	55.7	73.5	68.3	67.7	71.4	72.3
Beaumont	NA	NA	NA	NA	56.2	49.5	60.2
Brownsville	7.3	10.9	44.5	15.3	14.5	21.2	25.3
Bryan/CS	30.1	47.7	69.8	60.8	61.8	62.1	67.6
Corpus Christi	18.8	37.2	52.1	53.7	50.9	58.4	56.1
Dallas	26.4	44.7	59.7	48.7	54.3	59.2	49.4
El Paso	NA	32.1	55.5	48.6	54.5	47.9	57.3
Ft. Worth	NA	NA	NA	NA	63.2	59.1	65.4
Houston	19.6	37.1	52.7	54.0	50.9	44.3	44.2
Lubbock	17.8	37.0	60.1	54.0	46.4	52.3	50.6
San Antonio	18.7	42.8	53.0	57.5	42.0	40.1	46.1
Tyler	19.8	42.5	66.6	55.1	56.3	62.0	64.0
Waco	20.6	36.0	52.7	42.0	48.8	46.5	46.0
Pre-law Avg.	**21.5**						
Post-law Avg.							
(for 12 cities)		**38.3**	**58.4**	**49.7**	**49.8**	**49.8**	**51.9**
(for 14 cities)					**51.2**	**50.4**	**53.5**

*Percentages reflect correct and incorrect restraint use for all children observed.

Figure 1 provides a graphic description of correct child restraint use at three major shopping centers in the city of Austin. Data from previous surveys have been combined with data collected in the present wave of the survey to provide a longitudinal analysis of child restraint use.

The first peak in the data occurred in January of 1985 when enforcement of the child passenger safety law first began with the imposition of fines. After that initial peak, there was a general decline in correct restraint use through the month of June, 1985. Beginning in July, correct usage began to increase, continuing to rise through the three-month warning period of the mandatory safety belt law in Texas. Then, when enforcement of the safety belt law first went into effect with sanctions (December 1985), a noteworthy peak in the data was evidenced. The rates remained at a stable, high level throughout 1986, and another noteworthy peak occurred in May of 1987. The seven months that constitute the most recent data collected revealed a range in usage of between 54 and 70.5 percent. The peak of 70.5 percent usage which occurred in October, 1989, is the highest usage observed since May of 1987. Other than the low month of December (54 percent), usage was consistently in the 60 percent range. Overall, child restraint use observed on a monthly basis revealed a great deal of variation during the early phases of legislative implementation. During this period (October, 1984, through December, 1985) an upward trend in use was observed. However, during the past 28 months the trend of use has not increased or decreased significantly, and less variability has been observed.

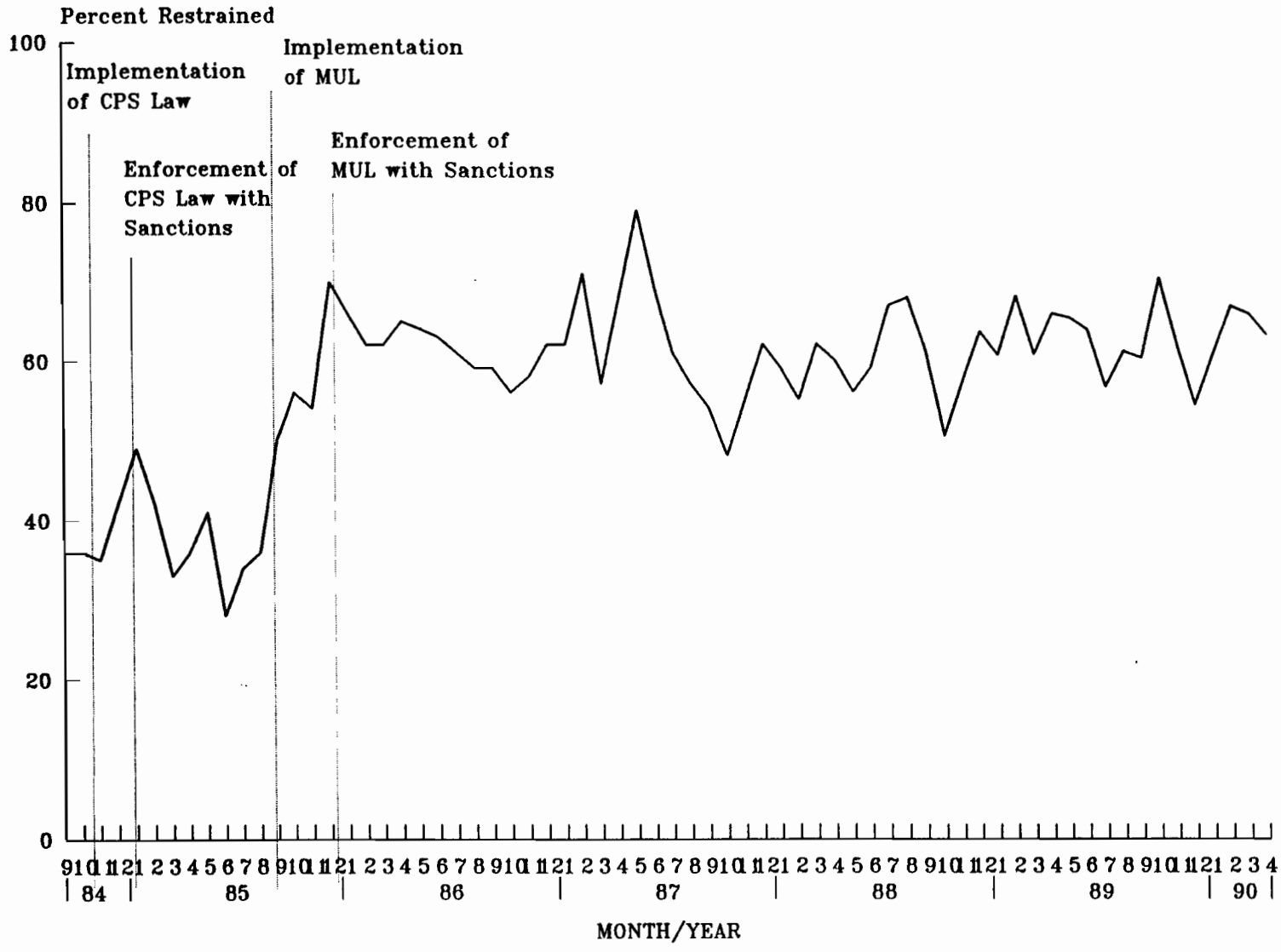

Figure 1. Monthly Observations of Correct Child Restraint Use at Three Austin Shopping Malls

Summary

The 1990 survey of child restraint use, conducted in 14 Texas cities, revealed that 48.1 percent of the 15,132 children observed were correctly restrained in a child safety seat or adult safety belt. The remainder of the child passengers were restrained incorrectly (5.3 percent) or not restrained at all (46.6 percent). The percentage of child restraint use varied from 25 to 72 percent across cities. Amarillo, Beaumont, Brownsville, Bryan/College Station, El Paso, and Fort Worth showed significant increases in child restraint use from 1989. A decreases was observed in Dallas. The remainder of the cities did not show a significant change from the previous year. In combination, these changes represent a significant increase from 1989 of 2.6 percent in correct child safety seat and adult lap belt use and a significant decrease of 2.5 percent in the total number of children riding unrestrained.

REFERENCES

Hatfield, N.J., W.M. Hinshaw, N.G. Bunch, R. Bremer, and A.E. Waller, Observed Child Restraint Use in 12 Texas Cities Before and After Child Passenger Safety Legislation, Texas Transportation Institute, Texas A&M University System, December 1985.

Kernish, R., and L. London, Strategies to Increase the Use of Child Safety Seats: An Assessment of Current Knowledge, National Analysts, Booz, Allen and Hamilton, Inc., December 1986.

Kugle, C.L., A.E. Waller O.J. Pendleton, R. Bremer, A Statewide Sampling Survey of Child Restraint Usage in Texas, Texas Transportation Institute, Texas A&M University System, April 1985.

Womack, K. N., and J. Fesenmaier, 1987 Survey of Front Seat Occupant Restraint Use in Fourteen Texas Cities, Texas Transportation Institute, Texas A&M University System, September 1987.