1998 Survey of Child Restraint Use in Fourteen Texas Cities

by

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The Texas child passenger safety law went into effect without sanctions on October 1, 1984; enforcement with the imposition of $25-$50 fines began on January 1, 1985. Since that time, TTI has collected data in selected cities throughout the State to monitor usage rates. This report presents the results of the 1998 survey conducted in 14 cities, and compares these findings to the results of the earlier surveys.

Survey Method

The 1998 observational survey of child restraint use was conducted in March in the following 14 cities:

Amarillo	El Paso
Austin	Fort Worth
Beaumont	Houston
Brownsville	Lubbock
Bryan/College Station	San Antonio
Corpus Christi	Tyler
Dallas	Waco

Observations were conducted at two types of sites, child care centers and shopping centers. Every attempt was made to keep the observation sites consistent between waves of the survey. In some cases, however, a child care center may have closed, or refused to give permission for the observation. In some cases, child care centers were operating on a limited basis or were temporarily closed during the survey period. Alternate child care center sites of similar size were selected when possible within the same zip code. At child care center sites an attempt was made to observe restraint usage for the population of the center. That is, to the extent possible, every child arriving or departing from the center was observed. At each shopping center location, data was taken for 50 children. The sample size at shopping center locations in years prior to 1993 was 100. Therefore, the shopping center data since 1992 has been weighted by a factor of two, to maintain a comparable contribution to the overall data set as in prior years.

As in previous years, the 1998 survey utilized Texas A&M University students as observers. Observers were provided with two training sessions totaling approximately eight hours. The first training session was a classroom setting consisting of a slide presentation, a video presentation, and a thorough discussion and demonstration of correct and incorrect child restraint use. The students then participated in practice observations at child care centers and shopping centers throughout the Bryan/College Station area. During the survey period, a TTI study staff member visited each observer at both a day care center and a shopping center site in each city to assure the accuracy of their observations.

Despite careful attention to observational technique in order to reduce errors in the data, several aspects of the survey method suggest the possibility of a bias that should be mentioned. First, observations conducted at child care centers during the morning drop-off time generally "catch" people unaware, so that upon arrival at the center their restraint behavior is not modified due to the presence of the observer. This assumes no prior notification to parents or guardians by the child care center. In most cases, participating child care centers cooperate in making the survey unannounced. Occasionally, however, parents and guardians are forewarned, and their restraint behavior may be modified, resulting in higher levels of restraint use than might occur without notification.

A more significant potential bias is introduced during the afternoon pick-up observation at child care centers because parents and guardians encounter the observer as they arrive at the center. This prompts questions inside the center. Once they are informed of the observer's purpose, their response may not exemplify their usual restraint behavior.

Other observational limitations concern varying degrees of detail that are site and situation dependent. Restraint misuse at shopping center sites are no doubt conservative estimates because observers collect data on vehicles entering or exiting the shopping center parking lot, and are not in a position to monitor the infant/child being placed in or taken out of the car. Additionally, the vantage point at child care centers does not always allow for close scrutiny of restraint misuse in all cases. Some child care centers are reluctant to allow observers to scrutinize vehicle interiors too closely. These situations are handled on an individual basis.

The child restraint use and misuse reported herein is based solely on observational data. Since permission to observe was not obtained from restraint users (only from site managers and directors), the specificity of the data is limited to what could be observed unobtrusively, and in the case of shopping centers, in moving vehicles.

Results of the 1998 Survey

13,782 observations were made in the 1998 survey. In this sample of 14 Texas cities, 52.0 percent of the children were riding correctly restrained in either an approved child safety seat or the vehicle safety belt. Twenty-two of these observations were of children riding in integrated car seat systems. An additional 15.2 percent were observed to be restrained, but in an incorrect and unsafe manner (e.g., child safety seat incorrectly installed, infant or child not secured properly in child safety seat, incorrect use of safety belt system). The remainder of the children in the total sample, 32.8 percent, were found to be riding unrestrained (5.0 percent held on laps), despite the legal mandate (Table 1). In 131 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 (126 cars and 5 pickups).

Child restraint use by location in the vehicle is shown in Table 2. The results indicate a significant difference in restraint use based on front or back seat position. The percentage of infants and children riding unrestrained was significantly higher for those in the front seat ($z=-7.40$, $p<.01$). Passengers in the back seat were more often restrained. This relationship held true when either one

child occupant was observed or multiple child occupants were observed in vehicles. One factor that contributed to the lower usage observed in front seats was the higher proportion of children being held in laps observed in front seats compared to back seats.

When the observations were examined by type of observation site, restraint use was found to be higher at child care centers than at shopping centers. While 68.0 percent of the children observed at child care centers were observed to be riding restrained in some manner, (correctly or incorrectly) 59.2 percent of the children observed at shopping centers were restrained (Table 3).

Analysis by vehicle type (car versus pickup truck) showed that children were more likely to be riding unrestrained in pickups. While 31.6 percent of the children in cars were not restrained by any system, 42.3 percent of the child passengers of pickups were not restrained (Table 4).

An analysis by individual city revealed that the percentage of child restraint use in the 14 cities varied from a high of 82.2 percent in Bryan/College Station to a low of 37.4 percent in Brownsville (Table 5). A breakdown of observed usage rates at day care centers and shopping centers for individual cities revealed that in San Antonio the proportion of unrestrained children observed at child care centers was dramatically higher than the proportion of unrestrained children observed at shopping centers. In all but three of the other cities surveyed, usage observed at day care centers was higher for the most part than that observed at shopping centers (Tables 6 and 7) and in three cities use at the two types of locations was about the same. Incorrect restraint use was observed more frequently at day care centers than at shopping center sites. As mentioned previously, 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.

It is important to note that the variation in restraint use within cities by site can be very large. While these combined data are presented as a city total, the results should not be interpreted as uniform restraint usage for the reported cities.

Trend Analyses

This section of the analysis compares child restraint use over the 14 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 explained previously, 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 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, the effect of observer bias is reduced.

Table 8 shows overall restraint use for each of the study cities over time. During the first year of the child restraint law, child restraint use increased by at least 50 percent in all study cities except Austin. (Austin's baseline usage rate was the highest of the original 11 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 (MULL) 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 of safety 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 of 1987.

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, one city showed an increase in use and four cities showed decreases. Increased child restraint use was observed in eight of 12 study cities in the 1989 survey. This trend in increased usage was evidenced in 1990 for six cities, in 1991 for eight cities, and in 1992 for nine cities. However, in 1993 only three cities showed increases in child restraint use. In 1994, increased child restraint use was observed in seven cities. In 1995 and again in 1996, four cities showed increases in levels of use. And in 1997, three cities showed increases in child restraint use.

None of the 14 cities showed a significant decrease in child restraint use in 1998. Eight cities had statistically the same usage rates. The 1998 survey indicated significant increases in child restraint use in six of the 14 cities. These cities were Amarillo ($z=-7.25$, $p<.01$), Bryan/College Station ($z=-2.34$, $p<.05$), Dallas, ($z=-2.00$,$p<.05$), El Paso ($z=-2.00$, $p<.05$) Lubbock ($z=-4.16$, $p<.01$), and Waco ($z=-2.67$, $p<.01$). Amarillo child restraint usage increased by over 20 percentage points to its highest usage ever.

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 ($z=-29.05$, $p<.01$ from 1984 to 1985; and $z=-35.04$, $p<.01$ from 1985 to 1986). However, a significant decline in total child restraint use was evidenced in 1987 ($z=14.74$, $p<.01$). During the two-year period following (1988 and 1989), child

restraint use for the 14 cities combined did not change to a statistically significant degree. The 1990 survey revealed the first significant increase in child restraint use since 1986 ($z=-5.43$, $p<.01$ from 1989 to 1990). Significantly greater use continued in 1991 ($z=-8.73$, $p<.01$). A small, statistically non-significant decrease in overall child restraint use was observed in 1992. The 1993 and 1994 surveys revealed statistically significant increases in overall child restraint use ($z=-2.85$, $p<.01$ in 1993 and $z=-3.58$, $p<.01$ in 1994). The average usage rate across the 14 cities significantly decreased in 1995 ($z=4.42$, $p<.01$). The 1995 decrease was reversed in 1996 ($z=-5.17$, $p<.01$) and continued upward in 1997. This trend continued in 1998 as the total proportion of restrained children observed in 1998 was significantly greater than the total proportion of restrained children in 1997 ($z=-7.86$, $p<.01$).

Summary

The 1998 survey of child restraint use, conducted in 14 Texas cities, revealed that 52.0 percent of the 13,782 children observed were correctly restrained in a child safety seat or vehicle safety belt. The remainder of the child passengers were restrained incorrectly (15.2 percent) or not restrained at all (32.8 percent). Children in the back seat were more likely to be restrained than those in the front seat. Overall, children were more likely to be riding in child safety seats or in vehicle safety belts when they were observed at day care centers in the survey sample and when they were in passenger cars rather than pickup trucks.

The percentage of child restraint use varied from 37.4 to 82.2 percent across cities. Six cities showed significant increases in child restraint use from 1997 (Amarillo, Bryan/College Station, Dallas, El Paso, San Antonio, and Waco). No significant decreases in 1998 usage rates were observed at the city level. The remaining eight cities did not show a significant change from the previous year. A statistically significant increase in restraint use was found when all child passengers in all cities observed were compared with those observed in 1997.

REFERENCES

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.

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.

Table 1. Observed Child Restraint Use For 14 Cities in Texas (1998) (N = 13,782)

Restraint Use	Frequency	Percent
Correctly Restrained:		
Correct use of child safety seat	4754	34.5
Correct use of vehicle safety belt	2411	17.5
Total	**7165**	**52.0**
Incorrectly Restrained:		
Incorrect use of child safety seat	660	4.8
Incorrect use of vehicle safety belt	1432	10.4
Total	**2092**	**15.2**
Unrestrained:		
No restraint	3834	27.8
Child held on lap	691	5.0
Total	**4525**	**32.8**

Table 2. Child Restraint Use by Seat Position

POSITION	Restrained		Unrestrained		TOTAL	
	N	(%)	N	(%)	N	%
Front Seat	2006	63.8	1139	36.2	3145	100.0
Back Seat	4547	71.4	1817	28.6	6364	100.0
Cargo Area	0	0.0	46	100.0	46	100.0

Table 3. Total Observations of Child Restraint Use by Type of Site

	SITE TYPE			
Restraint Usage	Day Care Center		Shopping Center	
	N	(%)	N	(%)
Correctly Restrained	2893	53.7	2207	52.9
Incorrectly Restrained	988	18.3	537	12.9
Unrestrained	1505	28.0	1429	34.2
TOTAL	5386	100.0	4173	100.0

Table 4. Child Restraint Use by Type of Vehicle

	VEHICLE TYPE			
Restraint Usage	Car		Pickup	
	N	(%)	N	(%)
Correctly Restrained	6527	53.3	638	41.3
Incorrectly Restrained	1839	15.0	253	16.4
Unrestrained	3873	31.6	652	42.3
TOTAL	12239	100.0	1543	100.0

Table 5. Observed Child Restraint Use in 14 Texas Cities

	Percent Restraint Use			
City (# Observed)	Correct	Incorrect	Restrained	Unrestrained
Amarillo (919)	65.7	6.9	72.6	27.4
Austin (854)	62.4	15.0	77.4	22.6
Beaumont (862)	49.9	20.2	70.1	29.9
Brownsville (824)	30.8	6.6	37.4	62.6
Bryan/College St. (872)	61.5	20.7	82.2	17.8
Corpus Christi (1037)	51.4	8.8	60.2	39.8
Dallas (1041)	60.3	11.4	71.8	28.2
El Paso (966)	46.4	13.7	60.0	40.0
Fort Worth (1019)	54.1	23.9	78.0	22.0
Houston (1353)	33.1	18.5	51.6	48.4
Lubbock (1096)	60.0	17.5	77.5	29.7
San Antonio (756)	41.3	14.9	56.2	43.8
Tyler (944)	64.0	15.6	79.6	20.4
Waco (1239)	56.9	16.5	73.4	26.6

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

	Percent Restraint Use			
City (# Observed)	Correct	Incorrect	Restrained	Unrestrained
Amarillo (329)	65.0	5.8	70.8	29.2
Austin (256)	73.8	16.4	90.2	9.8
Beaumont (362)	51.9	20.4	72.4	27.6
Brownsville (222)	47.7	13.5	61.3	38.7
Bryan/College St. (472)	57.2	25.2	82.4	17.6
Corpus Christi (437)	50.6	12.6	63.2	36.8
Dallas (339)	59.0	12.1	71.1	28.9
El Paso (413)	54.4	28.6	83.1	16.9
Fort Worth (413)	54.5	28.6	83.1	16.9
Houston (553)	40.9	23.1	64.0	36.0
Lubbock (430)	53.7	12.6	66.3	33.7
San Antonio (258)	41.9	17.4	59.3	40.7
Tyler (342)	59.1	21.9	81.0	19.0
Waco (641)	52.9	18.1	71.0	29.0

Table 7. Observed Child Restraint Use at Shopping Centers in 14 Texas Cities

City (# Observed, weighted by a factor of 2)	Percent Restraint Use			
	Correct	Incorrect	Restrained	Unrestrained
Amarillo (590)	66.1	7.5	73.6	26.4
Austin (598)	57.5	14.4	71.9	28.1
Beaumont (500)	48.4	20.0	68.4	31.6
Brownsville (602)	24.6	4.0	28.6	71.4
Bryan/College Station (400)	66.5	15.5	82.0	18.0
Corpus Christi (600)	52.0	6.0	58.0	42.0
Dallas (702)	61.0	11.1	72.1	27.9
El Paso (600)	50.0	11.7	61.7	38.3
Fort Worth (606)	53.8	20.8	74.6	25.4
Houston (798)	27.8	15.3	43.1	57.0
Lubbock (700)	55.4	10.0	65.4	34.6
San Antonio (450)	76.9	8.4	85.3	14.7
Tyler (602)	66.8	12.0	78.8	21.3
Waco (598)	61.2	14.7	75.9	24.1

Table 8. Observed Percentage of Restraint In Vehicles With One Child Occupant by City Over Time[a]

	1984[b]	1985[c]	1986[c]	1987[d]	1988[d]	1989[d]	1990[d]	1991[d]	1992[d]	1993[d]	1994[d]	1995[d]	1996[d]	1997[d]	1998[d]
Amarillo	18.1	38.9	64.0	49.3	56.3	37.3	45.9	53.2	52.5	65.7	57.2	49.1	54.5	58.0	75.0
Austin	45.0	60.9	75.7	73.9	70.6	76.5	74.4	80.2	73.8	68.6	77.5	76.0	90.7	77.9	79.3
Beaumont	NA	NA	NA	NA	60.6	50.8	67.8	68.6	64.0	63.6	74.0	65.5	75.7	70.3	71.5
Brownsville	8.3	15.6	50.9	17.2	13.9	19.3	27.2	35.1	34.1	22.9	33.3	39.2	32.5	38.4	37.7
Bryan/CS	33.6	51.3	73.8	62.2	63.1	62.9	69.8	79.6	77.7	76.1	74.1	80.4	83.4	79.1	83.1
Corpus Ch.	18.3	33.6	51.8	61.3	53.3	62.5	58.2	59.7	61.6	63.5	74.2	59.5	61.4	66.9	61.2
Dallas	28.2	49.8	65.5	52.9	55.7	62.7	53.1	71.5	66.2	62.9	62.3	60.6	69.2	65.0	70.6
El Paso	NA	35.6	60.0	54.3	57.2	52.8	59.9	47.1	55.1	42.6	56.6	50.7	52.6	58.0	61.8
Ft. Worth	NA	NA	NA	NA	63.3	63.8	68.5	71.9	71.2	63.2	66.2	77.7	75.0	75.7	77.4
Houston	24.3	44.4	60.3	56.7	52.1	48.5	45.5	53.5	51.4	55.7	60.4	58.4	56.1	59.5	54.5
Lubbock	20.2	47.4	65.4	59.7	53.6	54.4	53.2	70.7	64.4	62.7	74.3	77.3	68.0	68.7	73.8
San Antonio	20.4	53.0	61.9	58.7	43.5	42.5	47.6	50.2	59.6	61.4	56.1	62.6	65.6	63.7	57.7
Tyler	20.0	49.7	68.1	55.5	58.0	65.0	66.5	68.0	71.5	73.4	71.1	70.7	77.1	76.2	79.8
Waco	23.1	42.1	59.8	48.2	52.8	48.4	50.4	64.4	58.9	70.2	66.6	57.8	61.6	65.9	72.5

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

Table 9. Observed Child Restraint Use by City Over Time[a]

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Amarillo	16.5	35.9	60.3	38.8	49.6	32.1	43.8	51.2	46.7	62.4	52.9	42.9	45.5	47.4	72.6
Austin	40.6	55.7	73.5	68.3	67.7	71.4	72.3	76.6	71.2	70.7	74.3	72.6	85.3	78.1	77.4
Beaumont	NA	NA	NA	NA	56.2	49.5	60.2	63.6	63.8	63.7	66.6	56.6	72.0	66.9	70.1
Brownsville	7.3	10.9	44.5	15.3	14.5	21.2	25.3	31.5	33.0	22.0	31.4	36.8	26.1	35.3	37.4
Bryan/CS	30.1	47.7	69.8	60.8	61.8	62.1	67.6	78.1	74.8	74.8	70.5	78.4	80.0	79.5	82.2
Corpus Ch	18.8	37.2	52.1	53.7	50.9	58.4	56.1	59.0	59.5	64.3	75.0	55.6	56.0	67.3	60.2
Dallas	26.4	44.7	59.7	48.7	54.3	59.2	49.4	69.7	60.8	65.5	63.7	55.4	65.7	61.3	71.8
El Paso	NA	32.1	55.5	48.6	54.5	47.9	57.3	45.0	50.9	44.4	50.6	48.2	51.5	54.8	60.0
Ft. Worth	NA	NA	NA	NA	63.2	59.1	65.4	71.7	65.3	64.0	63.1	72.6	72.4	73.4	78.0
Houston	19.6	37.1	52.7	54.0	50.9	44.3	44.2	48.0	46.9	50.3	56.8	55.3	51.5	51.7	51.6
Lubbock	17.8	37.0	60.1	54.0	46.4	52.3	50.6	64.7	61.0	61.7	70.6	72.8	65.7	65.8	77.5
San Antonio	18.7	42.8	53.0	57.5	42.0	40.1	46.1	45.6	51.4	54.9	50.6	57.3	56.7	60.0	56.2
Tyler	19.8	42.5	66.6	55.1	56.3	62.0	64.0	61.2	65.8	70.0	66.9	68.3	74.4	75.6	79.6
Waco	20.6	36.0	52.7	42.0	48.8	46.5	46.0	59.6	56.0	59.5	63.0	45.9	55.5	65.2	73.4
Pre-law[b]	**21.5**														
Post-law[b]		**38.3**	**58.4**	**49.7**	**51.2**	**50.4**	**53.5**	**58.7**	**57.3**	**59.0**	**61.1**	**58.5**	**61.2**	**63.0**	**67.2**

[a]Percentages reflect correct and incorrect restraint use for all children observed.
[b]Averages represent average of percentages in column.