

**2008  
CHILD SAFETY  
RESTRAINT SYSTEM  
AND JUVENILE**

**SEAT BELT  
STUDY**



**Colorado Department of  
Transportation**



**INSTITUTE OF TRANSPORTATION MANAGEMENT**

# TABLE OF CONTENTS

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<b>LIST OF TABLES .....</b>	<b>ii</b>
<b>PREFACE .....</b>	<b>1</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>ADMINISTRATIVE EVALUATION .....</b>	<b>3</b>
<b>SUMMARY OF FINDINGS .....</b>	<b>4</b>
<b>CONCLUSIONS .....</b>	<b>13</b>

# LIST OF TABLES

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<u>Table</u>		<u>Page</u>
1	2007 and 2008 Estimates of Child Restraint and Juvenile Seat Belt Usage .....	7
2	2008 Usage Rates by Vehicle Speed.....	8
3	2008 Driver Seat Belt Usage Statistics.....	8
4	2008 Child Restraint Usage by Vehicle Type.....	9
5	2008 Juvenile Seat Belt Usage by Vehicle Type.....	9
6	2008 Colorado County Results.....	10

# PREFACE

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The purpose of the project was to conduct a comprehensive survey of child safety restraint system usage and seat belt usage for juveniles for the State of Colorado in 2008. Observations for child car seat and juvenile seat belt usage were conducted over a two-week period from June 15 to June 28 immediately following the 2008 Statewide Survey. The study was conducted by the Institute of Transportation Management, College of Business, Colorado State University, under the sponsorship of the Colorado Department of Transportation, Office of Transportation Safety. Observational data were collected and analyzed by the Institute of Transportation Management.

The objective of the *Child Safety Restraint System and Juvenile Seat Belt Usage Study* was to obtain an estimate of car seat usage for children (0 - 4 years) and seat belt usage for juveniles (5 - 15 years). Besides information on children and juveniles, there is also seat belt usage data on the drivers of the vehicles observed.

It is hoped that the results of this study will assist the CDOT Office of Transportation Safety in making future transportation safety program decisions.

# EXECUTIVE SUMMARY

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The Institute of Transportation Management (ITM) at Colorado State University conducted a comprehensive *Study of Child Safety Restraint System (Child Car Seats) Usage and Juvenile Seat Belt Usage* during the last two weeks of June. The survey was designed to observe drivers, children (0 - 4 years), and juveniles (5 - 15 years). Vehicles included in the survey were passenger cars, trucks, vans, and SUVs. Commercial vehicles were not part of the study. Trained observers monitored 50 sites in 20 counties across the State from June 15 through June 28.

Raw data collected from the survey were entered into the SAS System database and submitted to the College of Natural Sciences Statistics Laboratory for independent analysis. The results of the analyses of the data are included herein.

The Institute of Transportation Management is pleased to have participated in the 2008 Colorado Seat Belt Usage Surveys. The design of this study is representative of the population movements and trends within the State of Colorado and thus provides a useful projection of actual seat belt usage. The data and the analyses submitted to CDOT/OTS are, to the best of my knowledge, accurate and complete.

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# ADMINISTRATIVE EVALUATION

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Observers and supervisors received training emphasizing the need for consistency and accuracy in data collection and the survey process. Dr. Mike Gould and Brenda Ogden were responsible for conducting the one-day training program. The observers were provided information on how to properly collect and report the data. In addition, each observer was supplied with data collection sheets, maps, site locations, and the supervisor's telephone numbers to facilitate completion of the seat belt usage survey.

The *Child Safety Restraint System and Juvenile Seat Belt Usage Study* was conducted June 15 through June 28, 2008. This phase of the study, which was carried out immediately following the *Statewide Seat Belt Study*, encompassed 50 sites across 20 counties with each site observed on two separate dates.

Overall, the project objectives were accomplished within the time horizon and budget agreed to by CDOT and ITM.

As in previous seat belt usage surveys conducted by the Institute of Transportation Management, retired Colorado State Highway Patrol Officers were used as observers whenever possible. This staffing arrangement works very well since the troopers' familiarity with interstate and state highways, as well as local and county roads and safety procedures, helps to minimize potential location issues and safety problems. The patrol officers have proven to be very conscientious and reliable and have helped strengthen the validity of the results.

The Statistics Laboratory of the College of Natural Sciences also played a significant role in this study. Besides contributing to the reliability and validity of usage estimates with statistical analyses, the Statistics Laboratory also gives the analyses independence from the survey process.

By using these two groups of independent contractors, the Institute has taken measures to ensure the integrity of the survey and analyses while involving people in the study who have the most relevant skills.

# SUMMARY OF FINDINGS

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## Survey

The study was conducted using observational sites selected previously by the CDOT Office of Transportation Safety and modified by the Institute of Transportation Management, Colorado State University, to reflect population growth and shifts within the State.

During this study, 8,589 vehicles were observed. The tables contained in this report detail the results of observations made at the 50 sites across 20 counties. Each of the 50 sites was observed two times over two different weeks. A summary of key findings is provided below:

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### Children (0 - 4 years)

- In 2008, children (0 - 4 years) combined front seat and rear seat restraint usage for all vehicles was 86.9. This was an improvement over last year's rate of 83.13.
- In 2008, if the vehicle was a car, the combined front seat and rear seat restraint usage for children (0 - 4 years) was 83.6. This was an improvement over last year's 77.1.

### Juveniles (5 - 15 years)

- In 2008, juveniles (5 - 15 years) combined front seat and rear seat belt usage was 71.3, which represents an improvement over the 69.69 of 2007.
- In 2008, if the vehicle was a car, the combined front seat and rear seat belt usage for juveniles (5 - 15 years) was 65.0, an increase in the usage rate from last year's 58.9.
- Just as in the Statewide Survey, trucks have the lowest usage rate (52.5) for juveniles. This represents nearly a five point drop from last year's 57.4.

**See Table 1 for Comparative Analyses: 2007 and 2008 Estimates of Child Restraint and Juvenile Seat Belt Usage Statistics**

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**Children (0 - 4 years)**

- When considering speed of vehicles for the child safety restraint system, the usage was 80.6 for speeds 0-30 mph and 86.8 for speeds 31-50 mph.

**Juveniles (5 - 15 years)**

- When considering speed of vehicles for the juvenile seat belt usage rate, the usage rate was 63.0 for speeds 0-30 mph and 70.3 for speeds 31-50 mph. While this represents a drop of over five points for the lower speed, there was an improvement of over two points for the higher speeds.

**See Table 2: 2008 Usage Rates by Vehicle Speed**



- There were 8,589 total observations.
- Drivers of vans had the highest seat belt usage rate at 89.1. Trucks were the lowest with a 62.5 usage rate.
- Weekday drivers used seat belts at a slightly higher rate than weekend drivers (78.2 vs. 77.7).

**See Table 3: 2008 Driver Seat Belt Usage Statistics**



- Although the restraint usage for children (0 - 4 years) in the front seat by vehicle type was below 50% for Cars, Vans and SUVs, there are fewer children sitting in front seats. The rear seat restraint usage for children continued to be quite good with rates as follows: Cars 87.0, Vans 96.7 and SUVs 92.1. All of these rates are higher than last year's results.
- The high standard error for front seat restraint usage is evidence of the smaller numbers of children being placed in front seats.
- As a point of comparison, the restraint usage for children in the front seat of cars was 16.1. The rear seat restraint usage was 87.0.
- The total number of children in the front seat of all vehicles combined was only 169 this year compared to 282 in 2007.

**See Table 4: 2008 Child Restraint Usage by Vehicle Type**





- The seat belt usage for juveniles (5 - 15 years) in the front seat of a car was 68.6, and the rear seat belt usage was 62.7. Although relatively low, these figures represent an improvement over last year.
- Juvenile occupants of vans displayed the highest rate of seat belt usage with 84.5 for front seat passengers and 83.0 for rear seat passengers.

**See Table 5: 2008 Juvenile Seat Belt Usage by Vehicle Type**



- El Paso County had the highest rate of seat belt usage for drivers at 88.5. Yuma County was the lowest at 58.5
- For children in car seats, the county with the highest usage rate was Montrose with 98.7. Mesa County at 98.3 and El Paso with 98.2 were among the counties with the highest usage rates.
- The county with the best usage rate for juveniles was La Plata at 83.6.

**See Table 6: 2008 Colorado County Results**



**TABLE 1: 2007 and 2008 Estimates of Child Restraint and Juvenile Seat Belt Usage**

<b>Child Estimate</b>	<b>No. Obs</b>	<b>2007 Estimate</b>	<b>Fr&amp;Rear Estimate</b>	<b>Std Err</b>	<b>Child Estimate</b>	<b>No. Obs</b>	<b>2008 Estimate</b>	<b>Fr&amp;Rear Estimate</b>	<b>Std Err</b>
Car	1236	77.1			Car	1414	83.6		
Truck	40	64.1			Truck	33	64.7		
x-Cab	128	84.6			x-Cab	109	77.9		
Van	572	93.5			Van	427	94.9		
SUV	724	86.1			SUV	724	91.3		
<b>Total</b>	<b>2700</b>		<b>0.8313</b>	<b>.0072</b>	<b>Total</b>	<b>2647</b>		<b>86.9</b>	<b>.0066</b>
<b>Juvenile Estimate</b>	<b>No. Obs</b>	<b>2007 Estimate</b>	<b>Fr&amp;Rear Estimate</b>	<b>Std Err</b>	<b>Juvenile Estimate</b>	<b>No. Obs</b>	<b>2008 Estimate</b>	<b>Fr&amp;Rear Estimate</b>	<b>Std Err</b>
Car	1997	58.9			Car	2138	65.0		
Truck	170	57.4			Truck	145	52.5		
x-Cab	524	71.8			x-Cab	508	64.8		
Van	1089	83.3			Van	992	83.4		
SUV	1658	75.0			SUV	1513	76.4		
<b>Total</b>	<b>5438</b>		<b>.6969</b>	<b>.00662</b>	<b>Total</b>	<b>5296</b>		<b>71.3</b>	<b>.00621</b>

2007

Restraint Usage	95% Confidence Intervals		
		Lower	Upper
<b>83.13</b> Child		81.7	84.6
<b>69.69</b> Juvenile		68.1	70.9

2008

Restraint Usage	95% Confidence Intervals		
		Lower	Upper
<b>86.9</b> Child		85.6	88.2
<b>71.3</b> Juvenile		70.1	72.6

**TABLE 2: 2008 Usage Rates by Vehicle Speed**

**TABLE 2a: 2008 Child Restraint Usage  
with Vehicle Speed  
Child (0 - 4)**

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 80.6	Estimated Seat Belt Use: 86.8
Std Error: 3.6	Std Error: 1.3

**TABLE 2b: 2008 Juvenile Seat Belt  
Usage with Vehicle Speed  
Juvenile (5 - 15)**

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 63.0	Estimated Seat Belt Use: 70.3
Std Error: 3.4	Std Error: 1.3

**TABLE 3: 2008 Driver Seat Belt Usage Statistics**

**TABLE 3a: Driver Seat Belt Usage by Weekday and Weekend**

	Seat Belt Usage	Std Error	Lower Confidence Limit	Upper Confidence Limit
Weekday	78.2	0.9	76.5	79.9
Weekend	77.7	1.7	74.3	81.1

**TABLE 3b: Driver Seat Belt Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	76.0	0.9	74.1	77.8
Truck	62.5	2.8	56.9	68.2
Ex-Cab	65.2	1.9	61.4	68.9
Van	89.1	1.1	86.9	91.4
SUV	83.7	1.2	81.4	86.0

**TABLE 4: 2008 Child Restraint Usage by Vehicle Type****TABLE 4a: Front Seat Child Restraint Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	16.1	3.7	8.56	23.6
Truck	65.3	9.2	46.5	84.2
Ex-Cab	54.3	10.4	32.9	75.7
Van	40.0	10.2	18.4	61.6
SUV	37.5	9.6	17.7	57.3

**TABLE 4b: Rear Seat Child Restraint Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	87.0	1.3	84.4	89.7
Truck	No Rear Seat			
Ex-Cab	87.0	4.2	78.5	95.5
Van	96.7	1.2	94.3	99.1
SUV	92.1	2.3	87.6	96.6

**TABLE 5: 2008 Juvenile Seat Belt Usage by Vehicle Type****TABLE 5a: Front Seat Juvenile Seat Belt Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	68.6	1.7	65.4	71.9
Truck	56.2	3.3	49.5	62.8
Ex-Cab	59.4	3.2	53.1	65.8
Van	84.5	2.1	80.3	88.8
SUV	78.9	1.4	76.1	81.7

**TABLE 5b: Rear Seat Juvenile Seat Belt Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	62.7	1.5	59.6	65.7
Truck	No Rear Seat			
Ex-Cab	62.8	3.6	62.8	77.2
Van	83.0	1.8	83.0	90.0
SUV	72.2	3.3	72.2	85.2

**Table 6. 2008 Colorado County Results (95% Confidence Intervals)**

**Table 6a. Drivers Wearing Seat Belts**

<b>Counties</b>	<b>Seat Belt Estimate</b>	<b>Std Error</b>	<b>Lower Confidence Level</b>	<b>Upper Confidence Level</b>
<b>Adams</b>	70.0	2.4	65.0	75.0
<b>Arapahoe</b>	79.8	2.5	74.7	84.8
<b>Boulder</b>	75.4	1.8	71.7	79.1
<b>Denver</b>	80.5	2.0	76.5	84.4
<b>Douglas</b>	82.3	1.9	78.2	86.4
<b>El Paso</b>	88.5	1.3	85.9	91.1
<b>Fremont</b>	73.6	4.3	63.9	83.4
<b>Jefferson</b>	80.0	2.0	76.1	84.0
<b>Kit Carson</b>	70.6	4.6	60.2	81.0
<b>La Plata</b>	77.8	2.6	71.9	83.8
<b>Larimer</b>	76.8	2.0	72.7	80.8
<b>Las Animas</b>	60.1	3.3	52.7	67.6
<b>Mesa</b>	79.5	2.6	74.0	85.0
<b>Moffat</b>	71.1	2.5	65.4	76.8
<b>Montrose</b>	75.4	4.3	65.6	85.2
<b>Pueblo</b>	76.1	1.6	72.8	79.5
<b>Rio Grande</b>	71.3	4.5	61.0	81.6
<b>Summit</b>	80.4	1.9	76.2	84.6
<b>Weld</b>	79.4	3.8	71.4	87.4
<b>Yuma</b>	58.5	10.2	35.4	81.6

**Table 6b. Front Seat and Rear Seat Combined (Child 0-4)**

<b>Counties</b>	<b>Seat Belt Estimate</b>	<b>Std Error</b>	<b>Lower Confidence Limit</b>	<b>Upper Confidence Limit</b>
<b>Adams</b>	77.0	3.6	69.5	84.5
<b>Arapahoe</b>	73.2	5.3	62.5	83.9
<b>Boulder</b>	84.7	2.2	80.2	89.3
<b>Denver</b>	80.6	5.8	68.9	92.2
<b>Douglas</b>	71.5	5.0	60.7	82.2
<b>El Paso</b>	98.2	0.8	96.6	99.8
<b>Fremont</b>	85.6	2.7	78.9	92.3
<b>Jefferson</b>	89.1	2.8	83.4	94.8
<b>Kit Carson</b>	84.2	5.4	71.4	97.0
<b>La Plata</b>	85.5	4.5	75.2	95.7
<b>Larimer</b>	87.1	2.0	83.1	91.2
<b>Las Animas</b>	85.7	1.6	81.9	89.5
<b>Mesa</b>	98.3	1.6	94.9	99.9
<b>Moffat</b>	94.1	3.5	86.2	99.9
<b>Montrose</b>	98.7	1.1	90.1	99.9
<b>Pueblo</b>	92.9	1.8	89.0	96.7
<b>Rio Grande</b>	80.1	17.7	36.9	99.9
<b>Summit</b>	95.0	2.0	90.4	99.6
<b>Weld</b>	84.1	3.3	77.1	91.2
<b>Yuma</b>	66.8	6.0	53.1	80.5

**Table 6c. Front Seat and Rear Sear Combined (Juvenile 5-15)**

<b>Counties</b>	<b>Seat Belt Estimate</b>	<b>Std Error</b>	<b>Lower Confidence Limit</b>	<b>Upper Confidence Limit</b>
<b>Adams</b>	63.4	5.7	51.8	75.0
<b>Arapahoe</b>	62.3	3.5	55.9	69.9
<b>Boulder</b>	65.0	3.5	57.8	72.2
<b>Denver</b>	61.9	1.9	58.0	65.8
<b>Douglas</b>	68.8	4.0	60.3	77.2
<b>El Paso</b>	77.6	1.7	74.2	80.9
<b>Fremont</b>	67.4	2.8	60.9	73.8
<b>Jefferson</b>	74.7	3.0	68.8	80.7
<b>Kit Carson</b>	59.2	4.9	48.3	70.2
<b>La Plata</b>	83.6	2.3	78.4	88.8
<b>Larimer</b>	73.1	3.6	65.7	80.5
<b>Las Animas</b>	55.9	7.2	39.8	72.1
<b>Mesa</b>	72.2	2.8	66.4	78.1
<b>Moffat</b>	72.0	3.5	64.1	79.9
<b>Montrose</b>	76.5	5.9	63.1	89.9
<b>Pueblo</b>	63.5	3.6	56.0	71.1
<b>Rio Grande</b>	71.2	8.3	52.5	90.0
<b>Summit</b>	70.6	2.2	65.7	75.4
<b>Weld</b>	67.5	4.9	57.3	77.7
<b>Yuma</b>	64.5	9.0	43.8	85.2

# CONCLUSIONS

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The 2008 child/juvenile study shows that the overall results are slightly better than in 2007. The seat belt and restraint system usage is higher for children in the combined front and rear seats for all vehicle types, except for the X-cabs. The absolute numbers of children in the front seat is continuing to decline; however, the rates of usage of child restraint safety systems range from 16.1 to 65.3.

A similar observation can be made with the juvenile seat belt usage. Small improvements can be seen in most parameters for juveniles in the front seat. Likewise, in the case of the rear seat juvenile seat belt usage, the overall rate was higher in 2008 at 71.3 compared to 69.6 in 2007.

Caution should be used when reviewing the tables. If the standard error on any statistic (estimate of seat belt or child restraint usage) is greater than 5.0, in general, the number of observations of restraint or seat belt usage is too small to make the usage estimate significant. These smaller sample sizes lead to larger sampling errors. There are some situations in this year's survey where this is a concern. For example, for children (0 - 4 years) in the front seat of a truck, as shown in Table 4a, the estimate of usage is 65.3 and the standard error is 9.2. All vehicle types except cars have a standard error that is even higher for front seat safety restraint systems. These errors are so large as to put the estimate of seat belt usage in question. Most likely the error comes from small sample sizes and normal sampling errors that are inherent in survey sampling. These results in and of themselves are not in error since it is very likely that most drivers are placing children in the rear seat, and therefore fewer children are observed in the front seat of cars.

Overall, the results for juveniles (5 -15 years) are not as consistent as those for children (0 - 4 years) or adults. While parents are being reasonably responsible by securing young children in car seats, they are not taking similar precautions to ensure the safety of juveniles. While law enforcement can be expected to help improve seat belt usage rates, there is clearly a need to continue educational efforts focusing upon the safety of the juvenile occupants of vehicles.

The county data for drivers observed is fairly consistent with the more urban counties generally having higher usage rates than rural counties. Similar correlations for the combined front and rear seat usage of child safety restraint systems were not as strong as some of the rural counties had very high usage rates (Examples: Montrose = 98.7; Summit = 95.0).

Juvenile seat belt usage across the 20 counties was generally low and tightly grouped. The urban versus rural comparison did not hold with the highest rate of 83.6 in La Plata County. Denver County was among the lowest at 61.9 and only slightly higher than the 59.2 of Kit Carson County.



Overall, there was a slight upward trend in the use of child restraint safety systems and juvenile seat belts. Although the rates are still generally low for juveniles at 76.3, there have been improvements.

Educational efforts targeting juveniles will likely have positive results, but continued gains will require long-term programs. As young people need to hear the same or similar message many times before internalizing and changing behaviors, public service announcements and educational messages must make use of a multi-media approach.