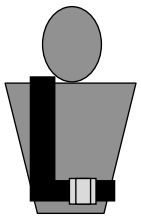
REVISED
2009 State of Colorado CHILD SAFETY RESTRAINT SYSTEM AND JUVENILE SEAT BELT SURVEY

Colorado Department of Transportation



SEAT BELT STUDY

Colorado State University®

INSTITUTE OF TRANSPORTATION MANAGEMENT

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PREFACE

The purpose of this project was to conduct a comprehensive survey of child safety restraint system and juvenile seat belt usage for the State of Colorado in 2009. Observations for child car seat and juvenile seat belt usage were conducted over a two-week period from June 14 through June 27 immediately following the 2009 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 (CDOT), Office of Transportation Safety. Observational (OTS) data were collected and analyzed by the Institute of Transportation Management.

The objective of the *Child Safety Restraint System and Juvenile Seat Belt Survey* was to obtain an estimate of car seat usage for children (newborn - 4 years) and seat belt usage for juveniles (5 - 15 years). Besides information on children and juveniles, seat beat usage data were collected 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

The Institute of Transportation Management (ITM) at Colorado State University conducted a comprehensive study of child safety restraint systems (child car seats) and juvenile seat belt usage from June 14 through June 27, 2009. The survey was designed to observe drivers, children (newborn - 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.

Raw data collected from the survey were entered into the SAS System database and submitted to the Franklin A. Graybill Statistical Laboratory of the College of Natural Sciences 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 2009 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 child safety restraint system and juvenile seat belt usage. The data and the analyses submitted to CDOT/OTS are, to the best of my knowledge, accurate and complete.

G. James Francis
Principal Investigator
Institute of Transportation Management
Colorado State University

ADMINISTRATIVE EVALUATION

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 Survey* was conducted June 14 through June 27, 2009. This phase of the study, which was carried out immediately following the *Statewide Seat Belt Survey*, 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. 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 Franklin A. Graybill Statistical 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 Statistical 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 individuals in the study who have the most relevant skills.

SUMMARY OF FINDINGS

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, 8,144 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 twice (one time during each week). A summary of key findings is provided below.

Estimates of Child Restraint and Juvenile Seat Belt Usage Statistics

Children (newborn - 4 years)

- In 2009, children (newborn - 4 years) combined front seat and rear seat restraint usage for all vehicles was 87.15. This was an improvement over last year's rate of 86.9.

- In 2009, if the vehicle was a car, the combined front seat and rear seat restraint usage for children (newborn - 4 years) was 81.3.

Juveniles (5 - 15 years)

- In 2009, juvenile (5 - 15 years) combined front seat and rear seat belt usage was 73.7, which represents an improvement over 71.3 in 2008.

- In 2009, the combined front seat and rear seat belt usage for juveniles (5 - 15 years) in cars was 67.2 – an increase in the usage rate from last year's 65.0.

- Just as in the Statewide Survey, trucks have the lowest usage rate (60.1) for juveniles. However, this represents a statistically significant improvement over last year's 52.5.

See Table 1 for Comparative Analyses: 2008 and 2009 Estimates of Child Restraint and Juvenile Seat Belt Usage Statistics

TABLE 1: 2008 and 2009 Estimates of Combined Front and Rear Child Restraint and Juvenile Seat Belt Usage

Child Estimate	**No. Obs**	**2008 Estimate**		Std Err
Car	1414	83.6		
Truck	33	64.7		
x-Cab	109	77.9		
Van	427	94.9		
SUV	724	91.3		
Total	2647		**86.9**	.0066

Child Estimate	**No. Obs**	**2009 Estimate**		Std Err
Car	1202	81.3		
Truck	30	68.5		
x-Cab	135	78.3		
Van	495	95.9		
SUV	736	93.2		
Total	2598		**87.15**	.0074

Juvenile Estimate	**No. Obs**	**2008 Estimate**		Std Err
Car	2138	65.0		
Truck	145	52.5		
x-Cab	508	64.8		
Van	992	83.4		
SUV	1513	76.4		
Total	5296		**71.3**	.0062

Juvenile Estimate	**No. Obs**	**2009 Estimate**		Std Err
Car	1958	67.2		
Truck	169	60.1		
x-Cab	445	72.1		
Van	940	83.2		
SUV	1480	78.3		
Total	4992		**73.7**	.0065

2008

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

2009

Restraint Usage	95% Confidence Intervals		
		Lower	Upper
87.15	Child	85.7	88.6
73.7	Juvenile	72.4	75.0

2009 Usage Rates by Vehicle Speed (Table 2)

Children (newborn - 4 years)

- When considering speed of vehicles for the child safety restraint system, the usage rate was 84.6 for speeds 0-30 mph and 85.6 for speeds 31-50 mph. The higher usage rate at higher speeds is consistent with findings in other studies.

Juveniles (5 - 15 years)

- When considering speed of vehicles for juvenile seat belt usage, the usage rate was 73.1 for speeds 0-30 mph and 71.8 for speeds 31-50 mph. Juvenile seat belt usage rate for 0-30 mph is 73.1 in 2009 compared to 63.0 in 2008 but the lower seat belt usage at higher speeds is somewhat of an anomaly.

TABLE 2: 2009 Combined Front and Rear Usage Rates by Vehicle Speed

TABLE 2a: 2009 Child Restraint Usage by Vehicle Speed
Child (newborn - 4)

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 84.6	Estimated Seat Belt Use: 85.6
Std Error: 2.3	Std Error: 1.6

TABLE 2b: 2009 Juvenile Seat Belt Usage by Vehicle Speed
Juvenile (5 - 15)

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 73.1	Estimated Seat Belt Use: 71.8
Std Error: 1.8	Std Error: 1.4

TABLE 3: 2008 Combined Front and Rear Usage Rates by Vehicle Speed

TABLE 3a: 2008 Child Restraint Usage by 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 3b: 2008 Juvenile Seat Belt Usage by 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

2009 Driver Seat Belt Usage Statistics (Table 4)

- There were 8,144 total vehicle observations with drivers of vans having the highest seat belt usage rate at 90.8. Trucks were the lowest with a 72.0 usage rate; however, this is a significantly higher seat belt usage rate than in 2008 (62.5 – See Table 5).

- Weekend drivers used seat belts at a slightly higher rate than weekday drivers (81.3 vs. 80.2). These combined data are consistent with the findings of the overall Statewide study (81.1).

TABLE 4: 2009 Driver Seat Belt Usage Statistics

TABLE 4a: Driver Seat Belt Usage by Weekday and Weekend

	Seat Belt Usage	Std Error	Lower Confidence Limit	Upper Confidence Limit
Weekday	80.2	1.2	77.9	82.5
Weekend	81.3	2.0	77.4	85.3

TABLE 4b: Driver Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	76.5	1.2	74.2	78.9
Truck	72.0	3.9	64.2	79.9
Ex-Cab	75.9	2.1	71.7	80.1
Van	90.8	1.2	88.4	93.1
SUV	86.7	0.9	84.8	88.6

TABLE 5: 2008 Driver Seat Belt Usage Statistics

TABLE 5a: 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 5b: 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

2009 Child Restraint Usage by Vehicle Type (Table 6)

- Although the restraint usage for children (newborn - 4 years) in the front seat by vehicle type was below 50% for cars, there are fewer children sitting in front seats than in previous years. The high standard error for front seat restraint usage is evidence of the smaller numbers of children being placed in front seats.

- The rear seat restraint usage for children continued to be quite good with vans the highest at 96.3 and cars the lowest at 83.2.

TABLE 6: 2009 Child Restraint Usage by Vehicle Type

TABLE 6a: Front Seat Child Restraint Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	36.3	6.7	22.7	49.8
Truck	69.2	10.6	47.8	90.7
Ex-Cab	44.2	8.5	26.7	61.6
Van	60.0	10.2	38.4	81.6
SUV	62.1	5.9	50.2	74.1

TABLE 6b: Rear Seat Child Restraint Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	83.2	1.7	79.7	86.6
Truck	No Rear Seat			
Ex-Cab	90.0	3.3	83.4	96.6
Van	96.3	1.3	93.7	98.8
SUV	94.8	1.2	92.4	97.2

TABLE 7: 2008 Child Restraint Usage by Vehicle Type

TABLE 7a: 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 7b: 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

2009 Juvenile Seat Belt Usage by Vehicle Type (Table 8)

- The seat belt usage for juveniles (5 - 15 years) in the front seat of cars was 72.7, and the rear seat belt usage was 63.7. Although relatively low, these figures are consistent with last year's results.

- Juvenile occupants of vans displayed the highest rate of seat belt usage with 88.3 for front seat passengers and 81.5 for rear seat passengers. Van drivers also have the highest seat belt usage rate among vehicle type, so the result for juveniles is predictable (Table 4).

TABLE 8: 2009 Juvenile Seat Belt Usage by Vehicle Type

TABLE 8a: Front Seat Juvenile Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	72.7	1.6	69.6	75.8
Truck	61.5	4.3	52.9	70.2
Ex-Cab	72.9	2.8	67.4	78.4
Van	88.3	1.3	85.7	91.0
SUV	79.2	1.6	76.1	82.4

TABLE 8b: Rear Seat Juvenile Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	63.7	2.5	58.8	68.7
Truck	No Rear Seat			
Ex-Cab	70.1	4.7	60.8	79.5
Van	81.5	5.5	70.5	92.4
SUV	79.6	2.6	74.3	84.8

TABLE 9: 2008 Juvenile Seat Belt Usage by Vehicle Type

TABLE 9a: 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 9b: 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

2009 Colorado County Results (Table 10)

- Douglas and El Paso counties had high rates of seat belt usage for drivers at 88.9, but Fremont and Jefferson counties were the highest at 90.2 and 91.5, respectively (Table 10a).

- Moffat and Rio Grande counties were the lowest at 66.8 and 64.6, respectively, for driver seat belt usage (Table 10a).

- As shown in Table 10c, the county with the best usage rate for juveniles was Jefferson at 81.2.

Table 10. 2009 Colorado County Results (95% Confidence Intervals)

Table 10a. 2009 Drivers Wearing Seat Belts

Counties	Seat Belt Estimate	Std Error	Lower Confidence Level	Upper Confidence Level
Adams	79.0	1.8	75.4	82.7
Arapahoe	82.9	1.9	79.0	86.7
Boulder	74.8	2.7	69.3	80.3
Denver	85.5	1.6	82.2	88.7
Douglas	88.9	1.6	85.5	92.4
El Paso	88.9	1.0	86.9	90.8
Fremont	90.2	2.1	85.6	94.9
Jefferson	91.5	1.4	88.7	94.2
Kit Carson	82.0	8.5	62.7	99.9
La Plata	75.9	1.5	72.4	79.5
Larimer	80.3	3.7	72.7	87.9
Las Animas	74.0	4.6	63.4	84.6
Mesa	74.7	2.4	69.6	79.7
Moffat	66.8	4.4	56.8	76.9
Montrose	77.1	2.6	71.3	82.9
Pueblo	77.0	5.9	64.6	89.3
Rio Grande	64.6	10.4	41.3	88.5
Summit	86.6	2.2	81.5	91.6
Weld	76.5	2.8	70.7	82.4
Yuma	68.6	4.5	58.5	78.7

Table 10b. 2009 Front Seat and Rear Seat Combined (Child 0-4)

Counties	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Adams	81.9	2.8	76.2	87.7
Arapahoe	74.7	4.9	64.8	84.7
Boulder	82.2	3.7	74.6	89.8
Denver	80.9	4.2	72.5	89.3
Douglas	88.2	4.4	78.8	97.6
El Paso	86.2	3.9	78.4	94.0
Fremont	79.7	5.2	65.4	94.1
Jefferson	93.6	2.3	89.0	98.3
Kit Carson	91.8	5.9	77.9	99.9
La Plata	77.1	16.7	34.2	99.9
Larimer	86.7	2.7	81.1	92.4
Las Animas	54.4	4.6	42.6	66.2
Mesa	93.9	2.3	89.0	98.8
Moffat	95.9	1.3	93.0	98.9
Montrose	99.2	0.8	97.3	99.9
Pueblo	78.5	9.6	57.1	99.9
Rio Grande	93.3	6.0	77.9	99.9
Summit	88.1	4.2	78.5	97.7
Weld	89.0	2.8	83.0	94.9
Yuma	76.6	6.3	62.0	91.2

Of the 20 counties included in the study, six counties were above 90% usage for child restraint systems with Las Animas being the lowest at 54.4. Although Las Animas had a fairly high standard error (4.6) accounting for the wide range of confidence limits, it still is well below other counties with the next lowest being Arapahoe at 74.7.

Table 10c. 2009 Front Seat and Rear Seat Combined (Juvenile 5-15)

Counties	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Adams	68.0	2.7	62.5	73.4
Arapahoe	67.9	4.2	59.5	76.3
Boulder	62.4	4.2	53.7	71.0
Denver	71.3	3.0	65.3	77.4
Douglas	80.7	2.8	74.9	86.5
El Paso	81.1	1.2	78.6	83.6
Fremont	71.4	5.3	59.5	83.4
Jefferson	81.2	2.4	76.3	86.0
Kit Carson	75.2	13.5	44.7	99.9
La Plata	64.5	6.1	50.5	78.5
Larimer	71.0	3.7	63.3	78.7
Las Animas	64.4	3.4	56.6	72.1
Mesa	72.8	2.2	68.1	77.5
Moffat	68.8	6.3	54.6	83.0
Montrose	76.4	3.5	68.7	84.1
Pueblo	64.6	3.7	56.8	72.4
Rio Grande	57.7	8.3	38.9	76.5
Summit	72.3	4.4	62.1	82.5
Weld	69.0	5.6	57.1	80.8
Yuma	73.7	9.5	51.9	95.6

Juvenile seat belt usage rates are the lowest of all age-related studies. The highest rates of 81.2, 81.1, and 80.7, respectively, in Jefferson, El Paso, and Douglas Counties are approximately the same as the overall Statewide average of 81.1. All other counties (17) are below the average usage rate for the State with Rio Grande and Boulder being the lowest at 57.7 and 62.4, respectively.

CONCLUSIONS

The 2009 child/juvenile study resulted in slightly higher usage rates than in 2008. The restraint system usage is higher for children this year for all vehicle types, except for cars. The combined front and rear seat usage rate for 2009 is 87.15 compared to 86.9 in 2008. The absolute numbers of children in the front seat is continuing to decline although the rates of usage of child restraint safety systems in front seats range from 36.3 (cars) to 69.2 (trucks).

Due to relatively low numbers of observations in some counties, the standard errors were fairly high in those counties. In these cases, if the standard error on any statistic (estimate of seat belt or child restraint usage) is greater than 5.0, the number of observations of restraint or seat belt usage is probably too small to make an accurate usage estimate. There are some situations in this year's survey where this is a concern. For example, for children (newborn - 4 years) in the front seat of vehicles, as shown in Table 6a, the standard errors are so large that the estimate of seat belt usage is somewhat suspect. 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 vehicles.

A similar observation can be made with the juvenile seat belt usage. Small improvements can be seen in most parameters for juveniles for the combined front and rear seat usage rates. Every vehicle type showed improvements in 2009 with the exception of vans which had a slight drop from 83.4 to 83.2. The overall improvement in combined front and rear seat usage rates was significant, moving from 71.3 to 73.7.

Juvenile seat belt usage across the 20 counties was generally low and tightly grouped. The urban versus rural comparison did not always hold true with Boulder and Pueblo having relatively low rates of 62.4 and 64.6. However, the lowest was Rio Grande (a rural county) at 57.7.

Overall, the results for juveniles (5 -15 years) are not as good or consistent as those for children (newborn - 4 years), teen drivers, or adults. While parents are being responsible by securing young children in car seats, they apparently 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.

Generally, the county data for drivers observed is fairly consistent with the more urban counties having higher usage rates than rural counties. However, similar correlations for drivers in the combined front and rear seat usage of child safety restraint systems were not as strong because some of the rural counties had very high usage rates (Examples: Montrose = 99.2; Moffat = 95.9).

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 73.7, there were overall improvements. This age group remains the lowest in terms of seat belt usage and deserving of more attention in terms of safety education.

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.