



Child Restraint Device Use And Misuse Survey



October 2007



Prepared for:
Office of Highway Safety Planning
4000 Collins Road
Lansing, MI



Prepared by:
Wayne State University
Transportation Research Group
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16. Abstract This study reports the results of the Child Restraint Device Use and Misuse Survey. There were two portions of this study including an observational survey and an interview/inspection survey. The observational portion consisted of observing vehicles with children under the age of four as they drove through an intersection. For the observation portion, 98 sites were visited and 1,963 observations were obtained. This resulted in a child restraint device (CRD) usage rate of 91.8 percent in the State of Michigan. The interview/ inspection portion consisted of conducting interviews/inspections at fast-food restaurants, day care centers, shopping areas, and recreational locations. For this portion, 75 sites were visited and 300 interviews/ inspections were conducted. The results of this survey showed that 80.1 percent of the CRDs inspected were installed incorrectly. The most errors were found in the harness straps and CRD installations not being tight enough. The CRD usage rate has increased since the last study conducted in 2005; however, the misuse rate has also increased.			
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1.0 INTRODUCTION

Children who are involved in a traffic crash may suffer severe injuries due to the lack of, or improper use of, child restraint devices (CRD). Children may be exposed to heightened risks of injury when traveling in an automobile due to a variety of factors including: improper use of CRDs, improper installation of CRDs, use of inappropriate size CRDs for a child's age/weight/height, moving children to regular safety belts too soon, lack of knowledge regarding the potential safety dangers and risks when traveling with children, and others. In spite of many of these factors, CRDs are generally effective; however, they are much more effective when properly installed and used.

Traffic crashes are responsible for the death of many children ages 0 to 4 years old and are one of the leading causes of fatality among children between ages 1 to 4. In Michigan, there are approximately 650,215 children under the age of five according to the U.S. Census Bureau July 2005 Estimates [1]. In 2005, seven children between ages 0 to 3 were killed in automobile crashes in Michigan and an additional 806 children were injured [2]. In order to alleviate children being injured or killed, a law was passed in Michigan in 1982 making CRD use mandatory for children under the age of four. Unfortunately, as previous studies have shown (2005), more than 70 percent of CRDs used were installed incorrectly. The data from the 2005 study indicates that more than 40 percent of the children killed under the age of four were restrained with a CRD. In addition, nearly 70 percent of those children injured were also restrained in CRDs. This data indicates that the majority of the children killed or injured during automobile crashes may have been restrained in a CRD improperly.

A study was conducted in 2003 at the University of Buffalo to assess child restraint system safety [3]. The findings of the study indicate that the most severe misuse of a CRD is belt slack. The University of Buffalo study concluded that "38% belt slack leads to head contact with the seat cushion, producing an undesired high head acceleration response" [3]. Another severe type of misuse includes a loose harness, which produces large chest and head acceleration levels [3].

Another study conducted in 2002 in Canada assigns severity scores for various types of CRD misuse. The study utilized three CRD forensic experts to rate the devices on a scale from 0 to 10

with 10 indicating the most negative impact on safety. The scores were averaged and it was determined that severity scores of four or more are unacceptable and would impact the effectiveness of the CRD during an automobile crash [4].

Although the 2005 Michigan law requires children under the age of four to be restrained with a CRD, 50 percent of the children killed and 26 percent of the children injured were not in a CRD [5]. The lack of CRD use may be related to financial issues or a lack of knowledge of Michigan's law.

In order to assess the impact of this law, the Office of Highway Safety Planning (OHSP) funded a statewide survey in 1997 of CRD use and misuse in Michigan. In the 1997 survey, conducted by researchers at the University of Michigan-Transportation Research Institute (UMTRI), direct observational surveys of child restraint device use and misuse were performed at pediatric medical and day care centers. The results of the survey estimated that 74.5 percent of children, age four years and under, are restrained in a CRD when traveling in a motor vehicle. In terms of misuse, improper restraint in some form or other was observed in 88.5 percent of the inspections, which is a very high rate of CRD misuse.

In 2005, OHSP funded another statewide survey of CRD use and misuse in Michigan. This study, conducted by the Wayne State University-Transportation Research Group (WSU-TRG), found that out of 1,560 observations, 79.7 percent of children, ages four and under, were restrained with the use of a CRD. In addition, 147 interviews were conducted which included the physical inspection of a restrained child. The interview portion of the study found that only 28.6 percent of the CRD's utilized were installed correctly. Of the 71.4 percent of the devices that were incorrectly installed, the tether and the harness were the items that were most often incorrectly fastened.

In 1999, the LATCH system (Lower Anchors and Tethers for Children) was introduced in the design of newer vehicles to make CRD installation easier by eliminating the need to use safety belts to secure the CRD. Instead, vehicles equipped with the LATCH system have anchors that are built into the backseat of the vehicle to easily secure CRDs. The 2005 study conducted by

the WSU-TRG investigated the use of the LATCH system in vehicles and found that only 57.1 percent of the vehicles had LATCH available, but it was utilized in only 32.6 percent of the vehicles. In addition, the LATCH system was only used correctly in 27.1 percent of the vehicles.

1.1 Study Purpose and Objectives

The overall objective of this study is to track the changes in child restraint use and misuse that have occurred since the observational study of 2005, and to identify the degree of misuse of CRDs, which has not been documented in Michigan in earlier studies. This survey will provide valuable information regarding the changes in child restraint use in relation to various demographic groups throughout the State of Michigan. In addition, understanding the degree or severity of CRD misuse will assist agencies in identifying educational efforts that can be created to reduce severe misuse of CRDs.

The following are the specific objectives for this study:

1. To conduct an observational survey of CRD use in Michigan.
2. To conduct interviews/inspections to detect misuse rates and determine the degree of misuse of CRDs in Michigan.
3. To determine overall rates of CRD use and misuse in Michigan, as well as rates categorized by driver and vehicle characteristics, patterns, and degrees of misuse.
4. To assess deficiencies in the CRD misuse rates by comparing the results of the 2005 survey results with the current survey results.
5. To define degrees of the misuse severity and identify the common types of misuse that are more hazardous than others.
6. To identify educational programs that may be developed to reduce the severe misuse of CRDs.

1.2 Study Area

The study area for this project included the 25 counties that represent at least 85 percent of the five year and under age population in the State of Michigan.

2.0 METHODOLOGY

2.1 Observational Surveys

NHTSA does not require states to conduct child safety restraint observational studies and thus, does not provide any recommended procedure for conducting such surveys. However, NHTSA does have published guidelines for conducting safety belt surveys, which requires the inclusion of counties representing at least 85 percent of the state's population.

The previous 2005 study observational locations for the CRD use survey were based on NHTSA's safety belt survey requirements. However, an additional 80 sites were selected due to low CRD observations. Therefore, for this project the methodology was similar to NHTSA's safety belt survey requirements; however, instead of the state population, the 85 percent requirement was targeted toward children population. The U.S. Census Bureau estimates provide the breakdown of county populations by age groups. As the CRD use and misuse survey will examine children ages four and under, the census age breakdown of under five is appropriate. Table 1 shows that counties that represent 85 percent of the state's five years and under age population based upon the 2005 United States Bureau of Census Data Estimates.

A system for partitioning the candidate counties into various strata was developed for the 2005 May *Click It or Ticket* project and used in the 2005 Child Restraint Device Use and Misuse Survey. The county partitioning is based on the vehicle miles traveled and is shown in Table 2. For the safety belt surveys, approximately 19,000 occupant observations were conducted based upon the 2005 and 2006 surveys. This is approximately 0.3 percent of the seven million driving population in Michigan. To achieve a similar sampling percentage for the CRD use survey, a sample of 1,951 observations was required. Assuming 20 children were observed at each observational site, 98 sites were selected. The data collected for the 98 observation sites should provide an acceptable representation of the population. The number of observation sites in each stratum, based upon the percentage of total VMT per stratum, is also shown in Table 2. Based upon the calculations, 26 sites were selected in Stratum 1, 28 in Stratum 2, and 22 each in Strata 3 and 4.

Table 1. U.S. Census Bureau 2005 Under 5 Years of Age Census Data for Michigan by County

Total Michigan Under Five Year Old Population = 650,215

Name of County	Population	Percent of Statewide Population	Cumulative Percent Population
Wayne County	144,837	22.28%	22.28%
Oakland County	76,570	11.78%	34.06%
Macomb County	51,010	7.85%	41.90%
Kent County	46,569	7.16%	49.06%
Genesee County	31,022	4.77%	53.83%
Washtenaw County	20,845	3.21%	57.04%
Ingham County	18,232	2.80%	59.84%
Ottawa County	17,497	2.69%	62.54%
Kalamazoo County	15,563	2.39%	64.93%
Saginaw County	13,271	2.04%	66.97%
Muskegon County	11,903	1.83%	68.80%
Berrien County	10,832	1.67%	70.47%
St. Clair County	10,297	1.58%	72.05%
Jackson County	10,293	1.58%	73.63%
Livingston County	10,119	1.56%	75.19%
Calhoun County	9,512	1.46%	76.65%
Monroe County	8,651	1.33%	77.98%
Allegan County	7,243	1.11%	79.10%
Bay County	6,258	0.96%	80.06%
Lenawee County	6,194	0.95%	81.01%
Eaton County	6,193	0.95%	81.96%
Van Buren County	5,218	0.80%	82.77%
Lapeer County	5,210	0.80%	83.57%
Midland County	4,855	0.75%	84.31%
Grand Traverse County	4,719	0.73%	85.04%

Table 2. Vehicle Miles of Travel by Stratum

County	VMT (2004) (in Thousands)	Total VMT	Percentage of Total VMT	Number of Observation Sites	Number of Interview Sites
Stratum 1					
Ingham	2,589,095				
Kalamazoo	2,603,446				
Oakland	13,113,695				
Washtenaw	3,742,005				
Total Stratum 1 VMT		22,048,241	26.57%	26	20
Stratum 2					
Allegan	1,234,491				
Bay	1,325,042				
Eaton	1,189,516				
Grand Traverse	806,758				
Jackson	1,723,634				
Kent	5,773,450				
Livingston	1,954,324				
Macomb	6,527,891				
Midland	827,006				
Ottawa	2,077,284				
Total Stratum 2 VMT					
Stratum 3					
Berrien	2,180,694				
Calhoun	1,731,659				
Genesee	4,731,531				
Lapeer	892,081				
Lenawee	898,211				
Monroe	2,143,438				
Muskegon	1,447,105				
Saginaw	2,259,369				
St. Clair	1,624,723				
Van Buren	1,000,428				
Total Stratum 3 VMT					
Stratum 4					
Wayne	18,575,126				
Total Stratum 4 VMT					
Total Strata VMT		82,972,002	100%	98	75

The location of the potential 98 observation sites included the selection of sites that would have a high probability of child observation, and each selected intersection was near a destination that parents would normally bring their child. These destinations included fast-food restaurants, recreational facilities, shopping centers, grocery stores, day care centers, and other child-related destinations. The sites were randomly chosen using a method that ensured an equal probability for each location in each stratum to be selected as a candidate location. In order to randomly select the sites, a list of all the possible site destinations were generated and then assigned numbers by stratum. The numbers were then randomly selected for each stratum.

Upon determination of the sites, the direction of traffic flow, lane, day of the week and time of the day at each observation site were determined through a similar random selection method ensuring equal probability. For each location randomly selected, the direction of traffic flow for observation was chosen. Random numbers between one and four were selected for each intersection. The selected random numbers represented “1” for eastbound, “2” for southbound, “3” for westbound, and “4” for northbound. This process was used to select the direction of traffic flow as well as roadway for observation. In order to minimize travel time and distance required to conduct this study, the observation sites were clustered into geographic regions upon final selection of all the sites.

2.2 Interview Surveys

The methodology for this survey had two main differences as compared to the 1997 survey, which included: 1) using a larger number of sites in the sample and 2) selecting the type of sites in which the surveys were conducted. The child restraint misuse portion of the 1997 study included the collection of only 87 driver interviews. The 1997 study found that although 87 interviews were adequate to determine trends, it was not sufficient to draw conclusions regarding the misuse of CRDs in Michigan. For the CRD misuse portion of the 2005 study, 27 observation sites were selected for driver interviews, which included 147 driver interviews.

The number of interviews collected for this project is substantially greater than those previously collected, which were 87 and 147 driver interviews. Assuming that at least four interviews were conducted at each site, 75 sites were chosen. This resulted in 300 CRD interviews and

inspections. The number of interview sites in each stratum, based upon the percentage of total VMT per stratum, is also shown in Table 2 (pg. 6). Based upon the calculations, 20 sites were selected in Stratum 1, 21 sites in Stratum 2 and 17 sites each in Strata 3 and 4.

The sites available for random selection were similar to those selected for the 2005 project, such as fast-food restaurants, day care facilities, shopping centers, and recreational facilities. For each county, in each stratum, a list of all available sites was generated. Each site in a stratum was then assigned a random number and chosen by a method ensuring equal probability of selection. The day of the week was also selected through a similar random process. In order to minimize travel time and distance required to conduct this study, the observation sites were clustered into geographic regions upon final selection of all the sites.

Based upon the 2005 study, 15 percent of the inspection interview site establishments refused to participate in the study even after prior agreements were in place. For this study, letters were sent to each establishment prior to the data collection explaining the project and the data collection that would be occurring on their property. Multiple sites were chosen for the same day to overcome these issues and to assure that an adequate number of interviews were conducted.

3.0 OBSERVER AND INTERVIEWER TRAINING

Several staff members from the WSU-TRG participated in the observational surveys and the interview data collection. The observational survey data collectors were trained in data collection and participated in the safety belt observational surveys; however, for this project, they received specific training comprised of technical assistance and field data collection.

Members of the WSU-TRG who were responsible for conducting the misuse interviews were trained by a certified instructor, Mr. Richard Costello, who has successfully completed the National Highway Traffic Safety Administration (NHTSA) Standardized Child Passenger Safety Technical Training Course. Mr. Richard Costello is a certified Child Passenger Safety Technician Instructor with an up-to-date certification (Certificate ID I558517) effective through

12/5/07. This individual provided training on child safety restraint use and misuse to the field data collection team.

Each member of the data collection team was required to reach 90 percent reliability and repeatability in their field collection and interview tests prior to collecting data for this project. The repeatability of a measurement depends on the within-subject standard deviation, which can be calculated using a sample of closely repeated measurements. The repeatability coefficient is simply the within-subject standard deviation adjusted by a probability-based factor and is an estimate of the maximum difference likely to occur between two successive measurements on the same subjects. Reliability concerns the extent to which repeated measurements by the same method on the same subjects produce the same result. These may be by the same observer, or different observers, and may investigate reliability over time.

During the training session for the data collection team, each member of the team received a training manual comprised of the information received during the training session, the schedule of data collection and all necessary field supplies.

The field data collectors were instructed to submit their observation data on a daily basis. The data was immediately entered and compiled onto computer spreadsheets at our WSU campus office. Comparisons were made between the observed rates and the expected child restraint use rates in order to identify any unexpected deviations in the data. Following this one-day turn-around time, the quality of the field data was maintained to represent the child restraint use rate of the driving population. Communication between the field data collection team and the supervisors was critical to the success of this project. The office team was very dedicated to ensuring the quality of the data collection effort.

4.0 DATA COLLECTION

The WSU-TRG conducted a direct observational study of CRD use and misuse in Michigan. The field data collection began in December of 2006 and continued through September of 2007.

For each observation site, a goal of 20 children traveling in vehicles was observed in a 60-minute time frame. Reasonable attempts were made to collect a similar number of observations of CRD use/nonuse data for all the study sites.

Additional data collection efforts were coordinated with the *Click It or Ticket* safety belt observational surveys in May and June of 2007. Based upon the previous 2005 study, the data obtained from these surveys was not adequate to obtain a statistically valid sample; therefore, additional locations were selected to collect CRD data later in the summer.

During the observation portion of the data collection, several factors were assessed. The driver of each vehicle and children under the age of four were observed for safety belt usage and child restraint device usage, respectively. The driver and child passenger characteristics were categorized based on gender, race, and estimated age. The race categories included Caucasian, African American, Asian or Pacific Islander, Hispanic, and Native American. The age categories for the driver included 16-29, 30-59, and 60+. The vehicle type categories included passenger vehicle, sport utility vehicle, van or minivan, and pick-up trucks. A sample observation form can be found in Appendix I.

The interview portion of the data collection involved visual and hands-on inspection of the child restraint devices for children under the age of four. Data on the driver included gender, age and race. Data on the children included age, height, and weight. The vehicle types were noted so that they could be classified by passenger vehicle, sport utility vehicle, van or minivan, or pick-up truck. The child restraint device was inspected for type, location in the vehicle, direction of placement, attachment to the vehicle, and placement of the child in the device. Each child restrained in a CRD was inspected for misuse of the CRD, as well as the degree of misuse. The errors in restraining children properly were carefully recorded along with descriptive notes. A sample interview form can be found in Appendix I.

5.0 DATA ANALYSIS

The data collected in the field was computerized and verified for accuracy by the project supervisor. Rates for child restraint device use and misuse were determined for each stratum,

each county and a statewide average. A 95 percent confidence interval for the estimate of child restraint device use and misuse was calculated in order to meet the federal guidelines of NHTSA. The data was also analyzed and compared with the 1997 and 2005 studies to assess the progress of CRD use and misuse.

A severity score was determined for both the forward-facing CRDs and rear-facing CRDs. The severity scores were taken from the study conducted in Canada in 2002 [4]. This study used the severity scores developed from Czernakowski and Müller's "Misuse Mode and Effects Analysis" (MMEA) [6]. Three experts with backgrounds in CRD forensics and usability rated the misuse based on the likelihood of occurrence and the effect the error has on the safety of the child in the CRD in the event of a crash. A severity score of '10' is the highest and a severity score of '0' is the lowest. The severity scores of the three experts were averaged and used in the study conducted in Canada and in this study. According to the authors, a severity score of '4' or higher will compromise the effect of the CRD on the child's safety during a crash [4]. The severity scores were multiplied by the frequency of errors that occurred during the interviews conducted as a part of this study. This resulted in the risk priority numbers. The risk priority numbers were added together to determine the total risk priority number for both the forward-facing CRD and rear-facing CRD. These numbers were then compared to determine which type of CRD resulted in the highest total severity based on the errors that were observed.

6.0 RESULTS AND CONCLUSIONS

6.1 Observational Surveys

The total number of vehicular observations was 1,963 for the CRD observation survey. Table 3 provides the descriptive statistics of the day of the week and the time of day the observations were collected.

The CRD use rates can be described by the overall use rate, by stratum, by vehicle type and by various demographics. Table 4 summarizes the overall CRD use rate for the state. The not belted category for the driver includes the two improperly belted categories; belted with the shoulder belt under the arm and belted with the shoulder belt behind the back. As shown in Table 4, the driver safety belt usage rate was 97.8 percent, while the CRD usage rate was 91.8 percent.

Table 3. Statewide Descriptive Statistics

Day of Week	No. of Sites Observed	Percent of Sites in Day of Week	Total No. of Observations	Percent of Observations in Day of Week
Sunday	8	8.2%	151	7.7%
Monday	24	24.5%	463	23.6%
Tuesday	14	14.3%	290	14.8%
Wednesday	4	4.1%	95	4.8%
Thursday	22	22.4%	448	22.8%
Friday	19	19.4%	392	20.0%
Saturday	7	7.1%	124	6.3%
Total	98	100%	1,963	100%
Time of Day	No. of Sites Observed	Percent of Sites in Time of Day	Total No. of Observations	Percent of Observations in Time of Day
8 am – 9 am	1	1.0%	11	0.6%
9 am – 10 am	7	7.1%	139	7.1%
10 am – 11 am	3	3.1%	62	3.2%
11 am – 12 pm	15	15.3%	286	14.6%
12 pm – 1 pm	12	12.2%	270	13.7%
1 pm – 2 pm	22	22.5%	416	21.2%
2 pm – 3 pm	10	10.2%	203	10.3%
3 pm – 4 pm	16	16.3%	353	18.0%
4 pm – 5 pm	8	8.2%	153	7.8%
5 pm – 6 pm	4	4.1%	70	3.5%
Total	98	100%	1,963	100%

Table 4. Statewide Safety Belt and CRD Use Summary

	No. of Observations	Percent
Driver Belt Use		
Not Belted	44	2.2%
Belted	1,919	97.8%
Total	1,963	100%
CRD Use		
Not in CRD	160	8.2%
Belted in CRD	1,803	91.8%
Total	1,963	100%

From the observed data, it seems that there is some relationship between driver safety belt use and CRD use as shown in Table 5.

Table 5. Driver Safety Belt Use and CRD Use Data

CRD Use	Driver Safety Belt Use			
	No. of Observations Not Belted	Percent	No. of Observations Belted	Percent
Child Not Belted in CRD	6	0.3%	154	7.9%
Belted in CRD	38	1.9%	1,765	89.9%
Total	44	2.2%	1,919	97.8%

Table 6 summarizes the CRD use by strata and by county.

Table 6. CRD Use by Stratum and County

	All Vehicles Safety Belt Use		
Stratum 1	Total No. of Observations with a Child Passenger	No. of Vehicle with CRD Use	Percent of Vehicles with CRD Use
Ingham County	129	124	96.1%
Kalamazoo County	112	99	88.4%
Oakland County	183	164	89.6%
Washtenaw County	113	108	95.6%
Total	537	495	92.2%
Stratum 2	Total No. of Observations with a Child Passenger	No. of Vehicle with CRD Use	Percent of Vehicles with CRD Use
Allegan County	41	41	100%
Bay County	43	36	83.7%
Eaton County	88	77	87.5%
Grand Traverse County	25	22	88.0%
Jackson County	51	46	90.2%
Kent County	23	22	95.7%
Livingston County	83	82	98.8%
Macomb County	159	155	97.5%
Midland County	22	18	81.8%
Ottawa County	30	30	100%
Total	565	529	93.6%
Stratum 3	Total No. of Observations with a Child Passenger	No. of Vehicle with CRD Use	Percent of Vehicles with CRD Use
Berrien County	11	11	100%
Calhoun County	57	54	94.7%
Genesee County	61	54	88.5%
Lapeer County	78	58	74.4%
Lenawee County	41	39	95.1%
Monroe County	42	39	92.9%
Muskegon County	45	45	100%
Saginaw County	46	43	93.5%
St. Clair County	45	43	95.6%
Van Buren County	22	21	95.5%
Total	448	407	90.8%
Stratum 4	Total No. of Observations with a Child Passenger	No. of Vehicle with CRD Use	Percent of Vehicles with CRD Use
Wayne County	413	372	90.1%

Other relationships between the time observed, driver characteristics, vehicle characteristics, and CRD use can be examined to determine their impact on the use of CRDs. Table 7 provides a summary of the CRD use based on the day of the week, time of the day, gender of the driver, age of the driver, race of the driver and type of vehicle. The highest CRD usage rates occurred on the weekends (Saturday and Sunday) and during the morning and afternoon hours. Female drivers tend to have a slightly higher CRD usage rate (92%) than male drivers (91.5%) and drivers over the age of 60 (95%) had the highest CRD usage rate. Asian or Pacific Islander drivers had the highest safety belt usage rate (97%) as compared to other races. Drivers of vans/minivans and sport utility vehicles had higher CRD usage rates of 97.7% and 96%, respectively, than the drivers of passenger cars (89.6%) and pick-up trucks (84.4%).

Table 7. All Vehicles CRD Use Summary

	All Vehicles		
Day of the Week	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Sunday	151	145	96.0%
Monday	463	409	88.3%
Tuesday	290	266	91.7%
Wednesday	95	84	88.4%
Thursday	448	408	91.1%
Friday	392	371	94.6%
Saturday	124	120	96.8%
Total	1,963	1,803	91.8%
Time of Day	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
8am–9am	11	11	100%
9am–10am	139	134	96.4%
10am–11am	62	55	88.7%
11 am–12 pm	286	253	88.5%
12 pm–1 pm	270	250	92.6%
1 pm–2 pm	416	395	95.0%
2 pm–3 pm	203	181	89.2%
3 pm–4 pm	353	321	90.9%
4 pm–5 pm	153	140	91.5%
5 pm–6 pm	70	63	90.0%
Total	1,963	1,803	91.8%

Table 7. All Vehicles CRD Use Summary (Cont)

Driver Gender	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Male	669	612	91.5%
Female	1,294	1,191	92.0%
Total	1,963	1,803	91.8%
Driver Age	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
16-29	647	583	90.1%
30-59	1,276	1,182	92.6%
60+	40	38	95.0%
Total	1,963	1,803	91.8%
Driver Race	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Caucasian	1,681	1,560	92.8%
African American	224	191	85.3%
Asian or Pacific Islander	33	32	97.0%
Hispanic	25	20	80.0%
Total	1,963	1,803	91.8%
Vehicle Type	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Passenger Cars	1,256	1,126	89.6%
Sport Utility Vehicles	298	286	96.0%
Vans/Minivans	345	337	97.7%
Pick-up Trucks	64	54	84.4%
Total	1,963	1,803	91.8%

Table 8 summarizes CRD use by vehicle type for day of the week, time of the day, driver gender, driver age, and driver race.

Table 8. CRD Use Summary by Vehicle Type

	Passenger Cars			Sport Utility Vehicles			Vans/Minivans			Pick-up Trucks		
Day of the Week	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Sunday	90	85	94.4%	24	23	95.8%	34	34	100%	3	3	100%
Monday	303	259	85.5%	64	61	95.3%	75	73	97.3%	21	16	76.2%
Tuesday	199	177	88.9%	38	38	100%	48	47	97.9%	5	4	80.0%
Wednesday	74	64	86.5%	7	6	85.7%	13	13	100%	1	1	100%
Thursday	282	251	89.0%	83	79	95.2%	73	70	95.9%	10	8	80.0%
Friday	233	218	93.6%	66	63	95.5%	77	76	98.7%	16	14	87.5%
Saturday	75	72	96.0%	16	16	100%	25	24	96.0%	8	8	100%
Total	1,256	1,126	89.6%	298	286	96.0%	345	337	97.7%	64	54	84.4%
Time of Day	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
8am–9am	5	5	100%	3	3	100%	3	3	100%	0	0	0%
9am–10am	79	76	96.2%	22	21	95.5%	30	29	96.7%	8	8	100%
10am–11am	33	27	81.8%	9	9	100%	15	15	100%	5	4	80.0%
11 am–12 pm	181	157	86.7%	44	40	90.9%	55	52	94.5%	6	4	66.7%
12 pm–1 pm	180	164	91.1%	39	37	94.9%	44	43	97.7%	7	6	85.7%
1 pm–2 pm	247	229	92.7%	76	75	98.7%	82	81	98.8%	11	10	90.9%
2 pm–3 pm	141	121	85.8%	33	31	93.9%	22	22	100%	7	7	100%
3 pm–4 pm	242	212	87.6%	50	49	98.0%	53	53	100%	8	7	87.5%
4 pm–5 pm	107	99	92.5%	13	12	92.3%	27	26	96.3%	6	3	50.0%
5 pm–6 pm	41	36	87.8%	9	9	100%	14	13	92.9%	6	5	83.3%
Total	1,256	1,126	89.6%	298	286	96.0%	345	337	97.7%	64	54	84.4%

Table 8. CRD Use Summary by Vehicle Type (Continued)

	Passenger Cars			Sport Utility Vehicles			Vans/Minivans			Pick-up Trucks		
Driver Gender	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Male	427	388	90.9%	98	91	92.9%	99	97	98.0%	45	36	80.0%
Female	829	738	89.0%	200	195	97.5%	246	240	97.6%	19	18	94.7%
Total	1,256	1,126	89.6%	298	286	96.0%	345	337	97.7%	64	54	84.4%
Driver Age	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
16-29	484	430	88.8%	83	80	96.4%	52	49	94.2%	28	24	85.7%
30-59	742	667	89.9%	211	202	95.7%	290	285	98.3%	33	28	84.8%
60+	30	29	96.7%	4	4	100%	3	3	100%	3	2	66.7%
Total	1,256	1,126	89.6%	298	286	96.0%	345	337	97.7%	64	54	84.4%
Driver Race	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use	No. of Vehicles Observed with a Child Passenger	No. of Vehicles with CRD Use	Percent of Vehicles with CRD Use
Caucasian	1,042	946	90.8%	266	257	96.6%	313	306	97.8%	60	51	85.0%
African American	174	146	83.9%	28	25	89.3%	20	19	95.0%	2	1	50.0%
Asian or Pacific Islander	21	20	95.2%	2	2	100%	10	10	100%	0	0	0%
Hispanic	19	14	73.7%	2	2	100%	2	2	100%	2	2	100%
Total	1,256	1,126	89.6%	298	286	96.0%	345	337	97.7%	64	54	84.4%

6.2 Interview Surveys

During the observation of the various sites throughout the state, 300 interviews were conducted. Seventy-three (73) interviews were performed at 20 sites for Stratum 1, 105 interviews at 21 sites for Stratum 2, 37 interviews at 17 sites for Stratum 3, and 85 interviews at 17 sites for Stratum 4. Table 9 summarizes the descriptive statistics regarding the interview surveys in terms of day of the week, and type of site.

Table 9. Interview Survey Descriptive Statistics

Day of the Week	No. of Sites Used	Percentage of Sites in Various Days of Week	No. of Interviews Performed	Percentage of Interviews in Day of Week
Sunday	5	6.7%	18	6.0%
Monday	9	12.0%	52	17.3%
Tuesday	10	13.3%	54	18.0%
Wednesday	12	16.0%	57	19.0%
Thursday	18	24.0%	47	15.7%
Friday	17	22.7%	59	19.7%
Saturday	4	5.3%	13	4.3%
Total	75	100%	300	100%
Type of Site	No. of Sites Used	Percentage of Sites in Various Days of Week	No. of Interviews Performed	Percentage of Interviews in Day of Week
Fast-Food Restaurants	24	32.0%	53	17.7%
Child Day Care Centers	13	17.3%	80	26.7%
Shopping Centers	36	48.0%	145	48.3%
Recreational Facilities	2	2.7%	22	7.3%
Total	75	100%	300	100%

Additional descriptive statistics can be used to describe the various interviews such as vehicle type, type of restraint, location of child, and age of child. Table 10 summarizes these statistics.

Table 10. Interview Data Summary

	No. of Interviews Performed	Percentage of Interviews
Vehicle Type		
Passenger Car	81	27.0%
Sport Utility Vehicle	96	32.0%
Van/Minivan	106	35.3%
Pick-up Truck	17	5.7%
Total	300	100%
Time of Day		
7 am – 8 am	11	3.7%
8 am – 9 am	21	7.0%
9 am – 10 am	15	5.0%
10 am – 11 am	21	7.0%
11 am – 12 pm	34	11.3%
12 pm – 1 pm	43	14.3%
1 pm – 2 pm	42	14.0%
2 pm – 3 pm	41	13.7%
3 pm – 4 pm	22	7.3%
4 pm – 5 pm	13	4.3%
5 pm – 6 pm	17	5.7%
6 pm – 7 pm	12	4.0%
7 pm – 8 pm	8	2.7%
Total	300	100%
Type of Restraint		
Rear-Facing CRD	46	15.4%
Forward-Facing CRD	162	54.0%
Belt Positioning Booster	82	27.3%
Shield Booster	0	0%
Integrated Seat	1	0.3%
Safety Belt	6	2.0%
Unrestrained	3	1.0%
Total	300	100%

Table 10. Interview Data Summary (Cont)

	No. of Interviews Performed	Percentage of Interviews
Location of Child		
Front Passenger	1	0.3%
Front Middle	1	0.3%
Second Row Left	93	31.0%
Second Row Center	49	16.3%
Second Row Right	140	46.7%
Third Row Left	6	2.0%
Third Row Middle	3	1.0%
Third Row Right	7	2.4%
Total	300	100%
Age of Child		
Less than 1 Year	53	17.7%
1 Year – Less than 2 Years	51	17.0%
2 Years – Less than 3 Years	59	19.7%
3 Years – Less than 4 Years	67	22.3%
4 Years	70	23.3%
Total	300	100%

Overall, only 19.9 percent of the interviews conducted with children in CRDs had the correct CRD selection and installation. Table 11 provides a summary of the correct and incorrect CRD selection and position percentages based on the child’s age, height and weight, and the installation of the seat.

Table 11. CRD Selection and Position

	Correct Installation Percent	Incorrect Installation Percent
Restraint appropriate for child’s age	95.0%	5.0%
Restraint appropriate for child’s height	95.3%	4.7%
Restraint appropriate for child’s weight	92.7%	7.3%
CRD facing proper direction for child’s age/weight	95.3%	4.7%
Seat intended to be used in direction installed	96.7%	3.3%
CRD installed on a forward-facing vehicle seat	97.0%	3.0%

Of the 46 rear-facing CRD interviews conducted, only 8.7 percent had the correct CRD selection and installation. Of the 162 forward-facing CRD interviews conducted, 12.3 percent had the correct CRD selection and installation. The types of installation errors found with the rear-facing and forward-facing CRDs are summarized in Tables 12 and 13, respectively.

Table 12. Rear-Facing CRD Installation Errors

Rear-Facing CRD Installation Errors	Correct Installation Percent	Incorrect Installation Percent
CRD was at the proper angle	91.3%	8.7%
Only one vehicle system was used to attach CRD	89.1%	10.9%
Internal harness was buckled	95.7%	4.3%
Harness straps were tight	50.0%	50.0%
Shoulder harness straps were in proper location	84.1%	15.9%
Harness straps were flat	86.4%	13.6%
Harness retainer clip was attached and threaded correctly	93.5%	6.5%
Harness retainer clip was in proper location	72.7%	27.3%
Crotch strap was flat	97.7%	2.3%
Seatbelt was buckled	78.3%	21.7%
Seatbelt was flat	79.4%	20.6%
Proper belt path/lower connector path was used	93.0%	7.0%
Latch plate, retractor locked or locking clips were used properly	82.1%	17.9%
Proper space was between the CRD and vehicle cushion	75.0%	25.0%
CRD installation was tight	58.7%	41.3%

Table 13. Forward-Facing CRD Installation Errors

Forward-Facing CRD Installation Errors	Correct Installation Percent	Incorrect Installation Percent
CRD was at the proper angle	98.1%	1.9%
Only one vehicle system was used to attach CRD	95.0%	5.0%
Internal harness was buckled	99.4%	0.6%
Harness straps were tight	59.6%	40.4%
Shoulder harness straps were in proper location	83.2%	16.8%

Table 13. Forward-Facing CRD Installation Errors (Cont)

Forward-Facing CRD Installation Errors	Correct Installation Percent	Incorrect Installation Percent
Harness straps were flat	82.5%	17.5%
Harness retainer clip was attached and threaded correctly	94.7%	5.3%
Harness retainer clip was in proper location	68.0%	32.0%
Crotch strap was flat	97.5%	2.5%
Seatbelt was buckled	97.7%	2.3%
Seatbelt/lower strap was flat	76.5%	23.5%
Proper belt path/lower connector path was used	96.5%	3.5%
Latch plate, retractor locked or locking clips were used properly	79.3%	20.7%
Proper space was between the CRD and vehicle cushion	62.3%	37.7%
Tether routed through proper location	87.0%	13.0%
Tether strap was flat	86.0%	14.0%
Proper slack was in the tether strap	71.2%	28.8%
CRD installation was tight	78.3%	21.7%

Of the 82 Belt Positioning Booster (BPB) CRD interviews conducted, 40.2 percent had the correct CRD selection and installation. The type of installation errors with the belt positioning boosters are summarized in Table 14.

Table 14. Belt Positioning Booster CRD Installation Errors

Belt Positioning Booster CRD Installation Errors	Correct Installation Percent	Incorrect Installation Percent
Lap and shoulder belt system used	97.6%	2.4%
Proper (3-point) belt was used	97.6%	2.4%
Shoulder belt was properly positioned	90.0%	10.0%
Shoulder belt was flat	80.0%	20.0%
Lap belt was properly positioned	91.5%	8.5%
Lap belt was flat	84.1%	15.9%
Seat belt was tight	87.8%	12.2%
Vehicle seat back was high enough to restrain child's head	96.4%	3.6%
Proper space was between the BPB back and vehicle cushion	81.7%	18.3%

There was only one integrated seat interview conducted. The CRD selection and installation for this interview was 100 percent correct.

The risk priority numbers for the rear-facing CRDs and front-facing CRDs were calculated as described in the Data Analysis section of this report and are shown in Tables 15 and 16, respectively. These tables also show the severity scores for the different types of misuse for the rear-facing CRDs and front-facing CRDS. As shown in the tables, the forward-facing CRDs resulted in a total risk priority number of 670.6, which was less than the rear-facing CRDs total risk priority number of 834.7.

Table 15. Rear-Facing CRD Severity Scores

Rear-Facing CRD Misuse	Severity Score [4]	Frequency	Risk Priority Number
CRD was reclined at improper angle	3	6.5%	19.5
Internal harness was not buckled	10	4.3%	43.0
Harness tightness is wrong (2 fingers)	1.7	34.1%	58.0
Harness tightness is wrong (3 fingers)	4.3	18.2%	78.3
Harness tightness is wrong (>4 fingers)	6.7	29.5%	197.7
Shoulder harness straps were too high	6.3	4.5%	28.4
Shoulder harness straps were too low	2.3	11.4%	26.2
Shoulder harness straps were twisted	2.7	13.6%	36.7
Harness retainer clip was not attached	2.3	6.5%	15.0
Harness retainer clip was too high	2.5	0.0%	0
Harness retainer clip was too low	2	27.3%	54.6
Crotch strap was twisted	3.5	2.3%	8.1
Seatbelt was not buckled	7	21.7%	151.9
Seatbelt routed incorrectly	9	7.0%	63.0
Space between CRD and vehicle cushion 1"	1	13.6%	13.6
Space between CRD and vehicle cushion 2"	3	4.5%	13.5
Space between CRD and vehicle cushion 3"	4	6.8%	27.2
Space between CRD and vehicle cushion 4"	5	0.0%	0
Total Risk Priority Number for Rear-Facing CRDs			834.7

Table 16. Forward-Facing CRD Severity Scores

Forward-Facing CRD Misuse	Severity Score [4]	Frequency	Risk Priority Number
CRD was reclined at improper angle	4.6	1.9%	8.7
Internal harness was not buckled	10	0.6%	6.0
Harness tightness is wrong (2 fingers)	1.3	43.5%	56.6
Harness tightness is wrong (3 fingers)	3.7	13.0%	48.1
Harness tightness is wrong (>4 fingers)	6.3	27.3%	172.0
Shoulder harness straps were too high	1.7	3.1%	5.3
Shoulder harness straps were too low	2.3	13.7%	31.5
Shoulder harness straps were twisted	1.3	17.5%	22.8
Harness retainer clip was not attached	2	5.3%	10.6
Harness retainer clip was too high	2.5	1.3%	3.3
Harness retainer clip was too low	1.5	30.7%	46.1
Crotch strap was twisted	3.5	2.5%	8.8
Seatbelt was not buckled	6	1.9%	11.4
Tether routed incorrectly	9	13.0%	117.0
Space between CRD and vehicle cushion 1"	2	20.4%	40.8
Space between CRD and vehicle cushion 2"	4	8.0%	32.0
Space between CRD and vehicle cushion 3"	5	6.2%	31.0
Space between CRD and vehicle cushion 4"	6	3.1%	18.6
Total Risk Priority Number for Forward-Facing CRDs			670.6

In addition to providing a comparison between the severity of misuses between the rear-facing CRDs and forward facing CRDs, these tables also show the type of misuse that should be emphasized on correcting. The misuses with the highest risk priority numbers should be the focus of correction. For rear-facing CRDs this includes harness straps not being tight enough and seat belts not being buckled. For forward facing CRDs this includes harness straps not being tight enough and tethers being routed incorrectly.

6.3 Program Comparisons

Table 17 summarizes the findings of the 2005 and the 2007 Child Restraint Device Use and Misuse Surveys. The table provides information about the observation and interview portions of the survey. As can be seen, the percentage of CRD use has increased from 79.7 percent in 2005 to 91.8 percent in 2007; however, the percentage of correct CRD installation has decreased from 28.6 percent in 2005 to 19.9 percent in 2007.

Table 17. 2005 and 2007 Comparison

Year of Survey	Observation Survey			Interview Survey		
	No. of Sites	No. of Observations	Percent CRD Use	No. of Sites	No. of Interviews	Percent Correct CRD Installation
2005	80	1,560	79.7%	27	147	28.6%
2007	98	1,963	91.8%	75	300	19.9%

6.4 Program Enhancements

Over the past several years, the safety belt usage rates for drivers and front-seat passengers has been steadily increasing and the CRD usage rate has also increased; however, the CRD misuse rate has increased from 71.4 percent in 2005 to 80.1 percent in 2007.

Parents must be provided with training at several key junctions in their child's growth. As a child grows, significant changes occur between birth and age four. The height and weight of children changes rapidly during these years. The installation of a CRD for a newborn is drastically different than that for a four year old child. As doctors and hospitals have regular visits with parents, training sessions can be incorporated into these visits involving the parent and doctor reviewing the CRD used and child position. Other avenues for CRD training can be provided at day care facilities prior to the drop-off or pick-up of a child. There are many locations throughout the State of Michigan where parents can have their CRD inspected by certified individuals. These individuals inspect the CRD installation and inform the parents if

they are using an incorrect CRD for their child. The use of these inspections should be emphasized to all parents with young children.

Introduced in 1999, the LATCH system has been installed in all vehicles assembled after September of 2002. The LATCH system is underutilized and the use of this system could decrease the misuse rates. Automobile dealers can provide group training to vehicle owners on the use of the LATCH system. In addition, pamphlets can be provided for parents as the majority of them are not utilizing their vehicle owner's manual for CRD installation information.

7.0 REFERENCES

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4. Rudin-Brown, C.M., et al., "Behavioral Evaluation of Child Restraint System (CRS) Label/Warning Effectiveness", Road Safety and Motor Vehicle Regulation Directorate, July 2002.
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APPENDIX I – SAMPLE OBSERVATION AND INTERVIEW FORMS

PASSENGER VEHICLE SAFETY BELT OBSERVATION FORM

Vehicle/Observation Number: _____ Location: _____

Traffic Flow/Direction: _____ Site Number: _____ Date: _____

Time Started Observations: _____ AM PM Time Ended Observations: _____ AM PM

Volume Count: _____ / _____ Observer's Name/s _____

VEHICLE			
TYPE:		USE:	
<input type="checkbox"/> Passenger Car	<input type="checkbox"/> SUV	<input type="checkbox"/> Non-Commercial	
<input type="checkbox"/> Van/Minivan	<input type="checkbox"/> Pickup Truck	<input type="checkbox"/> Commercial	
DRIVER			
BELT:	AGE:	GENDER:	RACE:
<input type="checkbox"/> Not Belted	<input type="checkbox"/> 16-29	<input type="checkbox"/> Male	<input type="checkbox"/> Caucasian
<input type="checkbox"/> Belted	<input type="checkbox"/> 30-59	<input type="checkbox"/> Female	<input type="checkbox"/> African American
<input type="checkbox"/> Shoulder Belt Behind Back	<input type="checkbox"/> 60+		<input type="checkbox"/> Asian or Pacific Islander
<input type="checkbox"/> Shoulder Belt Under Arm			<input type="checkbox"/> Hispanic
			<input type="checkbox"/> Native American
<input type="checkbox"/> No Passenger			
PASSENGER			
BELT:	AGE:	GENDER:	RACE:
<input type="checkbox"/> Child Seat	<input type="checkbox"/> 0-3	<input type="checkbox"/> Male	<input type="checkbox"/> Caucasian
<input type="checkbox"/> Not Belted	<input type="checkbox"/> 4-15	<input type="checkbox"/> Female	<input type="checkbox"/> African American
<input type="checkbox"/> Belted	<input type="checkbox"/> 16-29		<input type="checkbox"/> Asian or Pacific Islander
<input type="checkbox"/> Shoulder Belt Behind Back	<input type="checkbox"/> 30-59		<input type="checkbox"/> Hispanic
<input type="checkbox"/> Shoulder Belt Under Arm	<input type="checkbox"/> 60+		<input type="checkbox"/> Native American

VEHICLE			
TYPE:		USE:	
<input type="checkbox"/> Passenger Car	<input type="checkbox"/> SUV	<input type="checkbox"/> Non-Commercial	
<input type="checkbox"/> Van/Minivan	<input type="checkbox"/> Pickup Truck	<input type="checkbox"/> Commercial	
DRIVER			
BELT:	AGE:	GENDER:	RACE:
<input type="checkbox"/> Not Belted	<input type="checkbox"/> 16-29	<input type="checkbox"/> Male	<input type="checkbox"/> Caucasian
<input type="checkbox"/> Belted	<input type="checkbox"/> 30-59	<input type="checkbox"/> Female	<input type="checkbox"/> African American
<input type="checkbox"/> Shoulder Belt Behind Back	<input type="checkbox"/> 60+		<input type="checkbox"/> Asian or Pacific Islander
<input type="checkbox"/> Shoulder Belt Under Arm			<input type="checkbox"/> Hispanic
			<input type="checkbox"/> Native American
<input type="checkbox"/> No Passenger			
PASSENGER			
BELT:	AGE:	GENDER:	RACE:
<input type="checkbox"/> Child Seat	<input type="checkbox"/> 0-3	<input type="checkbox"/> Male	<input type="checkbox"/> Caucasian
<input type="checkbox"/> Not Belted	<input type="checkbox"/> 4-15	<input type="checkbox"/> Female	<input type="checkbox"/> African American
<input type="checkbox"/> Belted	<input type="checkbox"/> 16-29		<input type="checkbox"/> Asian or Pacific Islander
<input type="checkbox"/> Shoulder Belt Behind Back	<input type="checkbox"/> 30-59		<input type="checkbox"/> Hispanic
<input type="checkbox"/> Shoulder Belt Under Arm	<input type="checkbox"/> 60+		<input type="checkbox"/> Native American

CHILD RESTRAINT DEVICES INTERVIEW FORM (hands-on interaction) - Form for child occupants age 4 and under

Vehicle/Observation#: _____ Date: ____/____/20____ Time of Day: _____ am / pm Weather: _____ Observer's Name: _____

Location Name: _____ Address: _____

Notes: Use 1 form for each child occupant observed age 4 and under. Complete page one first. For occupants who are restrained, complete all questions on the second page.

Vehicle Type: 1 Passenger car 2 SUV 3 Van/minivan 4 Pick-up truck

Make: _____ Model: _____ Year: _____

Restrained Child Seating Position (circle number where child is seated):

Front of Vehicle	First Row	Second Row	Third Row	Cargo Area
	3	6	9	
	2	5	8	
	D	4	7	

Other Children Seating Position (circle numbers where children under age of 12 were seated):

Front of Vehicle	First Row	Second Row	Third Row	Cargo Area
	3	6	9	
	2	5	8	
	D	4	7	

Birthdate: ____/____/____ Age (fill in): _____ yrs OR ____ (mo if < 2 yr)

Weight (fill in and then circle category): _____ 1 <20 lbs 2 20-39 lbs 3 40-80 lbs 4 81+ lbs

Last time weighed: _____

Height: _____ (in inches)

Driver Age: 16 - 29 30 - 59 60+
 Driver Gender: Male Female

Driver Race: Caucasian African American Asian or Pacific Islander Hispanic Native American

Comments: _____

Restraint:

- 1 Rear-Facing CRD
- 2 Forward-Facing CRD
- 3 Belt Positioning Boosters (BPB)
- 4 Shield Booster
- 5 Integrated Seat
- 6 Seat Belt
- 7 Unrestrained (If unrestrained circle and stop the observation)

Law and Best Practices:

- 1. Child restrained in accordance with State Law? 1 Yes 2 No
 (Children up to age 4 must be properly buckled in a car set while riding in a motor vehicle.)
- 2. Is child riding in a back seat (2nd or 3rd row)? 1 Yes 2 No 3 NA

CRD Selection and Child Position (All seats)

- 1. Restraint appropriate for child's age? 1 Yes 2 No
- 2. Restraint appropriate for child's height? 1 Yes 2 No
- 3. Restraint appropriate for child's weight? 1 Yes 2 No
- 4. CRD facing proper direction for child's age/weight? 1 Yes 2 No 3 NA for SB
- 5. Seat intended to be used in the direction it is installed? 1 Yes 2 No 3 NA for SB
- 6. CRD installed on a forward-facing vehicle seat? 1 Yes 2 No 3 NA for SB

If child is in the front seat answer the following questions:

- 7. Does the vehicle have a passenger airbag? 1 Yes 2 No
- 8. If there is an airbag, is it turned off? 1 Yes 2 No 3 Don't Know
- 9. If the airbag is on, is the child at least 12" away from the airbag? 1 Yes 2 No 3 Don't Know
- 10. If the airbag is on, is the child facing forward? 1 Yes 2 No 3 Don't Know

For restrained occupants, is restraint use correct?

- 1 Yes (All CRD & Child Position questions and all Page 2 questions answered "Yes" or "N/A")
- 2 No (1 or more CRD & Child Position questions answered "No" and/or 1 or more Page 2 questions answered "No.")
- 3 Don't know (1 or more CRD Selection & Child Position questions answered "Don't know" and/or 1 or more Page 2 questions answered "Don't know." Or observer unable to complete entire observation.)

For Front-Facing CRDs (1 year AND 20 lbs)

1. Is the seat reclined properly (upright)? Yes No
2. Is only 1 vehicle system used to attach CRD (SB or Lower Anchors, not both)? Yes No NA
3. Is the internal harness buckle attached? Yes No
4. How tight are the shoulder harness straps (in fingers)?
 1 Finger 4 Fingers
 2 Fingers NA
 3 Fingers
5. Where are the shoulder harness straps?
 1 Just right (at shoulder level or above)
 2 Too high (above ears)
 3 Too low
 NA
6. Are the shoulder harness straps flat (not twisted)? Yes No NA
7. Is the harness retainer clip attached and threaded correctly? Yes No NA
8. Where is the harness retainer clip?
 1 Just right (at armpit level)
 2 Too high
 3 Too low
 NA
9. Is crotch strap flat (not twisted)? Yes No NA
10. Is seatbelt buckled? Yes No NA
11. Is seatbelt flat/lower strap (not twisted)? Yes No NA
12. Is the proper belt path/lower strap connector path used? Yes No NA
13. Is either the latch plate or seatbelt retractor locked, or locking clips used properly (1 inch from tongue)? Yes No NA
14. What is the space between the CRD back and vehicle seat back (in inches)?
 0 inches 3 inches
 1 inch 4 inches
 2 inches NA
15. Is the tether routed under an adjustable head restraint or over a non-adjustable head restraint? Yes No NA
16. Is tether strap flat (not twisted)? Yes No NA
17. How much slack is in the tether strap (in inches)?
 0 inches 4 inches
 1 inch 5 inches
 2 inches >5.5 inches
 3 inches NA
18. Is the CRD installation tight (1-inch rule)? Yes No NA

For Integrated Seats (usually in Minivans)

1. Is the harness or SB buckled? Yes No
2. Is the shoulder belt properly positioned over shoulder, collar bone, and chest? Yes No NA
3. Is the shoulder belt flat (not twisted)? Yes No NA
4. Is the lap belt properly positioned across the hips/upper thighs? Yes No NA
5. Is the lap belt flat (not twisted)? Yes No NA
6. How tight is the harness?
 0 inches 3 inches
 1 inch 4 inches
 2 inches NA

For Rear-Facing CRDs

1. Is the seat reclined properly (60° for >6 mos. Or 45° for <6 mos)? Yes No
2. Is only 1 vehicle system used to attach CRD (SB or Lower Anchors, not both)? Yes No NA
3. Is internal harness buckle attached? Yes No
4. How tight are the shoulder harness straps (in fingers)?
 1 Finger 4 Fingers
 2 Fingers NA
 3 Fingers
5. Where are the shoulder harness straps?
 1 Just right (at shoulder level or below)
 2 Too high
 3 Too low
 NA
6. Are the shoulder harness straps flat (not twisted)? Yes No NA
7. Is the harness retainer clip attached and threaded correctly? Yes No NA
8. Where is the harness retainer clip?
 1 Just right (at armpit level)
 2 Too high
 3 Too low
 NA
9. Is crotch strap flat (not twisted)? Yes No NA
10. Is seatbelt buckled? Yes No
11. Is seatbelt flat (not twisted)? Yes No NA
12. Is the proper belt path/lower strap connector path used? Yes No NA
13. Is either the latch plate or seatbelt retractor locked, or locking clips used properly? Yes No NA
14. What is the space between the CRD and vehicle seat base (in inches)?
 0 inches 4 inches
 1 inch 5 inches
 2 inches 6 inches
 3 inches NA
15. Is the CRD installation tight (1-inch rule)? Yes No NA

For Belt Positioning Boosters (BPB)

1. Is a lap and shoulder belt system used? Yes No
2. Is proper (3-point) belt being used? Yes No NA
3. Is the shoulder belt properly positioned over shoulder, collar bone, and chest? Yes No NA
4. Is the shoulder belt flat (not twisted)? Yes No NA
5. Is the lap belt properly positioned across the hips/upper thighs? Yes No NA
6. Is the lap belt flat (not twisted)? Yes No NA
7. Is the seat belt tight (not loose)? Yes No NA
8. If a backless BPB is being used, is the vehicle seat back high enough to restrain the child's head (vehicle seat back reaches child's ear height)? Yes No NA
9. What is the space between the BPB back and vehicle seat back (in inches)?
 0 inches 3 inches
 1 inch 4 inches
 2 inches NA

APPENDIX II – COMPLETE LISTING OF OBSERVATION SITES

STRATUM 1	
County	Location No.
Ingham County	1. Abbott and Burcham
	2. Grand River and Putnam
	3. M-36 and Columbia
	4. Cavannah and Pennsylvania
	5. Saginaw and Canal
	6. Saginaw and Marketplace
Kalamazoo County	1. Grand and Riverview
	2. Main and Drake
	3. Oakland and Howard
	4. Stadium and Howard
	5. US-131 and Lyon
Oakland County	1. 10 Mile and Meadowbrook
	2. 12 Mile and Telegraph
	3. 14 Mile and Main
	4. Airport and Hatchery
	5. I-696 and Orchard Lake
	6. Northwestern and Middlebelt
	7. Walton and Joslyn
	8. Walton and Lapeer
	9. Walton and Livernois
Washtenaw County	1. 8 Mile and US-23
	2. Geddes and Earhart
	3. Mooreville and Stony Creek
	4. Huron and Plymouth
	5. I-94 and Jackson
	6. Miller and Maple
STRATUM 2	
County	Location No.
Allegan County	1. 102 nd and 42 nd
	2. M-89 and US-131
Bay County	1. I-75 and Pinconning
	2. Washington and McKinley
Eaton County	1. Hartel and Lansing
	2. Lansing and Island
	3. Main and Canal
	4. Saginaw and Elmwood
Grand Traverse County	1. Hope and US-31
Jackson County	1. Michigan and Airline
	2. Michigan and Brown
	3. Parnal and Lansing

Kent County	1. US-131 and 84 th
	2. US-131 and 68 th
Livingston	1. Kensington and I-96
	2. M-36 and Hamburg
	3. Michigan and Grand River
	4. North and Grand River
Macomb	1. 11 Mile and Jefferson
	2. 14 Mile and Ryan
	3. 23 Mile and Van Dyke
	4. 9 Mile and Harper
	5. Gratiot and 21 Mile
	6. Gratiot and Masonic
	7. Gratiot and Utica
	8. M-19 and M-29
Midland County	1. Wheeler and Swede
Ottawa County	1. Washington and Beacon
STRATUM 3	
County	Location No.
Berrien County	1. I-94 and M-139
Calhoun County	1. Capital and Columbia
	2. Dickman and 20th
	3. Van Buren and Washington
Genesee County	1. Flushing and Ballenger
	2. I-475 and Bristol
	3. Saginaw and Maple
Lapeer County	1. Genesee and Main
	2. M-24 and Summit
	3. Main and Demille
Lenawee County	1. Monroe and US-223
	2. US-223 and Main
Monroe County	1. Dixie Hwy and Nadeau
	2. Sterns and Douglas
Saginaw County	1. Bay and Shattuck
	2. M-46 and Quarterline
	3. Janes and Outer Drive
St. Clair County	1. I-69 and Riley Center
	2. Main and Bordman
Van Buren County	1. I-196 and Phoenix

STRATUM 4	
County	Location No.
Wayne County	1. 7 Mile and Van Dyke
	2. Belleville and Ecorse
	3. Ecorse and Haggerty
	4. Ecorse and Monroe
	5. Eureka and Middlebelt
	6. Eureka and Telegraph
	7. Ford and Lilley
	8. Geddes and Canton Center
	9. Plymouth and Greenfield
	10. I-696 and Woodward
	11. Joy and Middlebelt
	12. Lilley and Palmer
	13. M-10 and 8 Mile
	14. M-39 and I-75
	15. Maple and Coolidge
	16. Michigan and Lothrop
	17. Michigan and Telegraph
	18. Plymouth and Farmington
	19. Racho and Eureka
	20. Telegraph and Northline
	21. Woodward and 13 Mile
	22. Woodward and Warren

APPENDIX III – COMPLETE LISTING OF INTERVIEW SITES

STRATUM 1	
County	Location No.
Ingham County	1. Burger King
Kalamazoo County	1. McDonalds
	2. Toys R Us
Oakland County	1. Arby's
	2. Detroit Zoo
	3. Hardee's
	4. KinderCare Learning Centers
	5. Kmart
	6. Kmart
	7. Kroger
	8. Kroger
	9. McDonalds
	10. Old Navy
	11. Toys R Us
	12. Wendy's
	13. Wendy's
	14. YMCA
Washtenaw County	1. Briarwood Mall
	2. Kmart
	3. Taco Bell
STRATUM 2	
County	Location No.
Allegan County	1. Burger King
	2. Kohls
Bay County	1. Target
	2. Walmart
Eaton County	1. Burger King
	2. Noah's Ark Day Care
Grand Traverse County	1. Alphabet Soup Pre-School
Jackson County	1. Jackson Crossing Mall
Kent County	1. Minds in Motion
	2. Woodland Shopping Center
Livingston County	1. Happy Acres Day Care
	2. Tanger Outlet Center
Macomb County	1. Arbys
	2. Babies R Us
	3. Costco
	4. Farmer Jack
	5. Kohls
	6. Subway
	7. Toddler Village Child Care

Midland County	1. Marshalls
Ottawa County	1. McDonalds
STRATUM 3	
County	Location No.
Berrien County	1. Walmart
Calhoun County	1. Harper Creek
	2. Sears
Genesee County	1. Burger King
	2. Genesee Valley Center
	3. McDonalds
	4. Target
Lapeer County	1. Kmart
Lenawee County	1. Burger King
	2. Subway
Monroe County	1. Horizon Outlet
	2. Interactions Child Care
	3. Kmart
Muskegon	1. Meijer
Saginaw County	1. Prime Outlet Mall
St. Clair County	1. Arby's
Van Buren County	1. McDonalds
STRATUM 4	
County	Location No.
	1. Babies R Us
	2. Babies R Us
	3. Farmer Jack
	4. Hand n' Hand
	5. Island Kiddie Care
	6. Little Tots Day Nursery
	7. McDonalds
	8. McDonalds
	9. McDonalds
	10. McDonalds
	11. O2BA Kid Child Care
	12. Rainbow Village Child Care and Preschool
	13. Sam's Club
	14. Spartan Food Mart
	15. Taco Bell
	16. TJ Maxx
	17. Westland Shopping Center