2015 POST-CLICK IT OR TICKET DIRECT OBSERVATION SURVEY OF SAFETY BELT AND CELL PHONE USE

Prepared for:
Michigan Office of Highway Safety Planning
333 South Grand Avenue
Lansing, MI

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Transportation Research Group
Detroit, MI

MICHIGAN OHSP Office of Highway Safety Planning

WAYNE STATE UNIVERSITY

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16. Abstract: This report documents the results of the 2015 Post-Click It or Ticket Direct Observation Survey of Safety Belt Use in the State of Michigan. Safety belt use by drivers and front seat passengers was monitored at a total of 200 intersection/interchange sites throughout the state during May and June of 2015. In addition to belt use, data were collected for vehicle type and use, as well as the gender, age, and race for each observed occupant, and electronic communication device use for each observed driver. The results of this survey show the safety belt usage rate in the state of Michigan is 92.8 percent. This represents a slight overall increase from the 92.0 percent use rate in 2014. Males and younger occupants, specifically those in pick-up trucks, continue to exhibit lower belt use rates. The observed rate of electronic device use by all vehicle drivers is 7.6 percent which represents a 2.6 percentage point decrease from the use rate observed in 2014.			
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1.0 INTRODUCTION

The use of safety belts is perhaps the single most effective means of reducing fatal and non-fatal injuries in motor vehicle crashes. In the first half of 2014, a statistical projection estimated 14,950 passenger vehicle occupants were killed in traffic crashes in the United States [1]. Past research indicates that the use of safety belts reduces the risk of fatal injury to front seat occupants by approximately 45 percent for passenger vehicles and 60 percent for light trucks. Moreover, the use of safety belts reduces the risk of moderate to critical injury by 50 percent for occupants of passenger vehicles and 65 percent for the occupants of light trucks. In 2013 alone, safety belts saved approximately 12,584 passenger vehicle occupants over the age of 5 [2]. A study in the *American Journal of Public Health* estimated that the use of safety belts would save "…more than $700 million a year in medical and emergency costs, lost productivity, insurance, rehabilitation costs, and legal costs" [3]. The Centers for Disease Control and Prevention estimate safety belts have saved approximately 255,000 lives since 1975 [4]. Therefore, even marginal increases in safety belt use rates have the potential to lead to important societal benefits.

In light of these facts, continuing efforts have been aimed at increasing the use of safety belts across the United States. According to a 2014 nationwide safety belt survey, 87 percent of drivers and right-front passengers use safety belts, which is identical to the measured 87 percent in 2013 [5]. The Midwest region as a whole showed an 83 percent seat belt use rate in 2013, slightly down the 85 percent seat belt use rate calculated in 2012 and 2013 [5]. In Michigan, past statewide safety belt use studies indicate the overall use among front seat occupants increased until 2009, prior to a series of gradual declines. Despite these declines, the 2014 use rate was 93.3 percent, making Michigan one of twenty states with safety belt use rates higher than 90 percent [6]. It is important to recognize Michigan is currently one of the thirty-four "primary law" states, which means a motorist can be stopped and cited for the sole reason of not wearing a safety belt while driving or riding as a front-seat passenger. In "secondary law" states, motorists must be stopped for another traffic-related offense in order to be ticketed for not wearing a safety belt [5]. Research has shown states with primary belt use laws experience, on average, a 10 percent increase in belt use compared to states with secondary laws [3].

As the non-use of safety belts is ultimately a behavioral issue, targeted programs aimed at changing occupant behavior related to the use of safety belts represent an important tool to increase use rates. Such programs should be targeted toward those occupants who are most prone to low use rates. Identification of such occupants is one of the principal goals of the statewide belt use surveys. Statewide safety belt use data can also be used for the following:

- To fulfill reporting requirements to NHTSA;
- To allocate statewide safety funding to specific program areas;

- To provide targeted funding to specific areas within the state where use rates are lower than the statewide average; and
- To provide targeted programs for certain segments of the population.

1.1 Study Purpose and Objectives

The purpose of this study was to perform the Post Click-It or Ticket (CIOT) Direct Observation Survey at 200 roadside locations to determine the percentage of drivers and front-seat passengers who were utilizing their safety belts correctly.

Additional objectives of this study were as follows:

- Develop a revised methodology, compliant with the Uniform Criteria for State Observational Surveys of Seat Belt Use, for estimating statewide belt use in an economically feasible manner;
- Provide training to all staff conducting the observation surveys and conduct quality assurance/quality control (QA/QC) of the data collection efforts;
- Conduct an observational survey of safety belt use for two weeks in the months of May and June;
- Summarize and cross-tabulate the observational data in a spreadsheet format indicating overall safety belt use, safety belt use by strata, safety belt use by time of day and day of week, and safety belt use by various demographic characteristics; and
- Continue to track changes in safety belt use and generate necessary comparative data and statistical analyses to assess the relevancy of the 2015 data and results to previous observational results.

1.2 Study Area

The study area for the statewide observational survey included those counties representing at least 85 percent of the passenger vehicle crash-related fatalities according to Fatality Analysis Reporting System (FARS) data averages for the years 2005 to 2009.

2.0 METHODOLOGY

The National Highway Traffic Safety Administration (NHTSA) issued new Uniform Criteria for State Observational Surveys of Seat Belt Use in *Federal Register Vol. 76, No. 63* (April 1, 2011, Rules and Regulations, pp. 18042 – 18059). The current survey plan represents Michigan's response to the requirement to submit to NHTSA a study and data collection protocol for an annual state survey to estimate passenger vehicle occupant restraint use. This plan is fully compliant with the Uniform Criteria and was utilized for the implementation of Michigan's 2015 safety belt survey.

2.1 Design of Study

Michigan is comprised of 83 counties; 33 of which account for about 85 percent of the passenger vehicle crash-related fatalities according to Fatality Analysis Reporting System (FARS) data averages for the years 2005 to 2009. Therefore, observation locations from within these 33 counties were selected for inclusion in the survey.

Using 2010 Topologically Integrated Geographic Encoding and Referencing (TIGER) data developed by the U.S. Census Bureau, a comprehensive list of road segments from within these 33 counties was created. Each of these road segments has been classified by the U.S. Census Bureau using the MAF/TIGER Feature Class Code (MTFCC). There are primarily three classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads (See Table 1 for detailed definitions). In addition, the listings include segment length as determined by TIGER. This descriptive information allowed for stratification of road segments. A systematic probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites. This process is explained in further detail in Section 3 of this report.

Table 1. Michigan MTFCC Codes Included by Default in the Road Segment File

Code	Name	Definition
S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway State Highway or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	These are generally paved non-arterial streets, roads, or byways that usually have a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

2.2 Data Collection Process

All passenger vehicles, including commercial vehicles weighing less than 10,000 pounds, were eligible for observation. The cover sheet and data collection form are shown in Appendix I. The cover sheet was designed to allow for documentation of descriptive site information, including: date, site location, site number, alternate site data, assigned traffic flow, number of lanes available and observed, start and end times for observations, and weather conditions. This cover sheet was completed by the data collector at each site before any observations took place.

The observation form was used to record seat belt use by drivers and front seat passengers. Additional data to be collected included occupant age, gender, and ethnicity, as well as vehicle type and use (e.g. commercial or non-commercial) information. Data regarding the use of electronic communication devices was also collected. This included information how the device was used as well (e.g. talking, texting, or hands-free). The forms were labeled from 1 to the total number of forms utilized at each site to assist with data review and inventorying.

The data collectors were instructed to observe as many lanes of traffic as they could while obtaining data on 99 percent of eligible vehicles. Only one direction of traffic was observed at any given site. This direction of observation was pre-determined at each location as explained further in section 3.1.

Observations were made of all drivers and right-front seat occupants. This included children riding in booster seats. The only right-front seat occupants excluded from this study were child passengers who were traveling in child seats with harness straps. Table 2 lists all categories of safety belt use that were observed by the data collectors.

Table 2. Safety Belt Use Codes and Definitions

Code	Definition
Belted	The shoulder belt is in front of the person's shoulder and used correctly.
Not belted	The shoulder belt is not in front of the person's shoulder or not used at all.
Unknown	It cannot reasonably be determined whether the driver or right front passenger is belted.

2.3 Alternate Sites and Rescheduling

If a site was temporarily unavailable due to a crash, short-term road work or maintenance, inclement weather, or any event that may hinder exact results, data collection was rescheduled for a similar time of day and type of day of the week. In the event the site was permanently unavailable, such as being located within a gated community or closed for long-term construction, then an alternate site selected as part of the reserve sample was to be used as a permanent replacement.

2.4 Quality Control Procedures

The quality control (QC) monitor made unannounced visits to five percent of all data collection sites over the duration of the study. The purpose of these visits was to ensure data collectors were following all survey protocol including: performing observational surveys at the assigned location, in the assigned direction, during the assigned time period, completing the cover sheet and observation forms correctly, making accurate observations of safety belt use within an appropriate number of lanes.

3.0 SELECTION OF OBSERVATIONAL LOCATIONS

This research design conforms to the requirements of the Uniform Criteria and allows for estimates of restraint use among front seat occupants in passenger vehicles. Michigan intends to update the sample of data collection sites every five years in order to have survey results that reflect geographic areas with more than 85 percent of crash-related fatalities. The sample design was provided to the Michigan Office of Highway Safety Planning under a consultant agreement with Wayne State University (see Appendix II for the resume of the Principal Investigators, Dr. Timothy Gates and Dr. Peter Savolainen). The design approach includes a stratified systematic PPS sample of data collection sites as described here:

1. All 83 counties in Michigan were listed in descending order of the average number of motor vehicle crash-related fatalities for the period from 2005 to 2009. Fatality Analysis Reporting System (FARS) data were used to determine the average number of crash-related fatalities per county. It was determined 33 counties accounted for at least 85 percent of Michigan's total crash-related fatalities during this period as shown in Table 3. These counties comprise the sample frame.

2. The counties were stratified according to historical safety belt use rates into four groups. These strata were constructed such that the annual vehicle miles of travel (VMT) were approximately balanced within each of the four groups. This represents the first stage of sample selection.

3. At the second stage, road segments were explicitly stratified by MTFCC (see Table 4). This resulted in a total of 12 strata (4 belt use groups, each with 3 MTFCC classes). The number of sites within each MTFCC class was determined proportionately based upon historical VMT, resulting in 30 percent primary roads, 60 percent secondary roads, and 10 percent local roads.

Table 3. Michigan Average Motor Vehicle Crash-Related Fatalities by County (2005-2009)

County	Average Fatality Counts (2005-2009)	Fatality Percentage Within Michigan	Cumulative Fatality Percentage
Wayne	172	16.5	16.5
Oakland	61.8	5.9	22.5
Kent	58.4	5.6	28.1
Genesee	48.6	4.7	32.7
Macomb	47.6	4.6	37.3
Washtenaw	31.4	3	40.3
Kalamazoo	25.4	2.4	42.8
Saginaw	24.4	2.3	45.1
Ottawa	23.6	2.3	47.4
Berrien	22.4	2.2	49.5
Monroe	20.6	2	51.5
Muskegon	19.2	1.8	53.3
Calhoun	18.8	1.8	55.1
Ingham	18.8	1.8	56.9
Livingston	18.6	1.8	58.7
Jackson	18.2	1.7	60.5
St. Clair	17.2	1.7	62.1
Allegan	16.6	1.6	63.7
Van Buren	15.8	1.5	65.2
Eaton	13.4	1.3	66.5
Lapeer	13.2	1.3	67.8
St. Joseph	13.2	1.3	69.1
Lenawee	12.4	1.2	70.2
Tuscola	11.4	1.1	71.3
Montcalm	10.6	1	72.4
Bay	10.4	1	73.4
Grand Traverse	10.2	1	74.3
Cass	10	1	75.3
Clinton	9.8	0.9	76.2
Sanilac	9.4	0.9	77.1
Shiawassee	9.4	0.9	78
Newaygo	9.2	0.9	78.9
Barry	8.8	0.8	79.8
Branch	8.8	0.8	80.6
Midland	8.8	0.8	81.5
Hillsdale	8	0.8	82.2
Ionia	7.8	0.7	83
Wexford	7.6	0.7	83.7
Clare	7	0.7	84.4
Gratiot	6.6	0.6	85.0

4. Road segments were then implicitly stratified by county and segment length. Specific segments were selected randomly with PPS from all segments within each stratum. A random, systematic sample of 50 road segments was selected PPS to road segment length within each belt use group. This process resulted in the selection of 200 road segments (4 belt use rate groups x 50 sites per belt use rate group, allocated proportionately among MTFCC classes). An additional 200 sites were also selected to use as alternates. Out of the 40 possible counties that comprised the sample frame, the final list of observation sites contained locations in 33 of the counties. Figure 1 shows a map displaying the 33-county statewide sample for the direct observation safety belt survey.

5. It was initially expected each site would result in a sample size of approximately 125 vehicles, resulting in approximately 25,000 vehicle observations overall based upon past experience with the Michigan Annual Seat Belt Use Study. Based on these figures, the standard error was expected to be less than 2.5 percent. In the event the calculated standard error should be greater than 2.5 percent, additional data would be collected from existing sites until this criterion was satisfied.

6. Additional stages of selection were used to determine travel direction, lane, and vehicles to be observed, at random and with known probability, as appropriate under the Uniform Criteria, as described in Section 3.1.

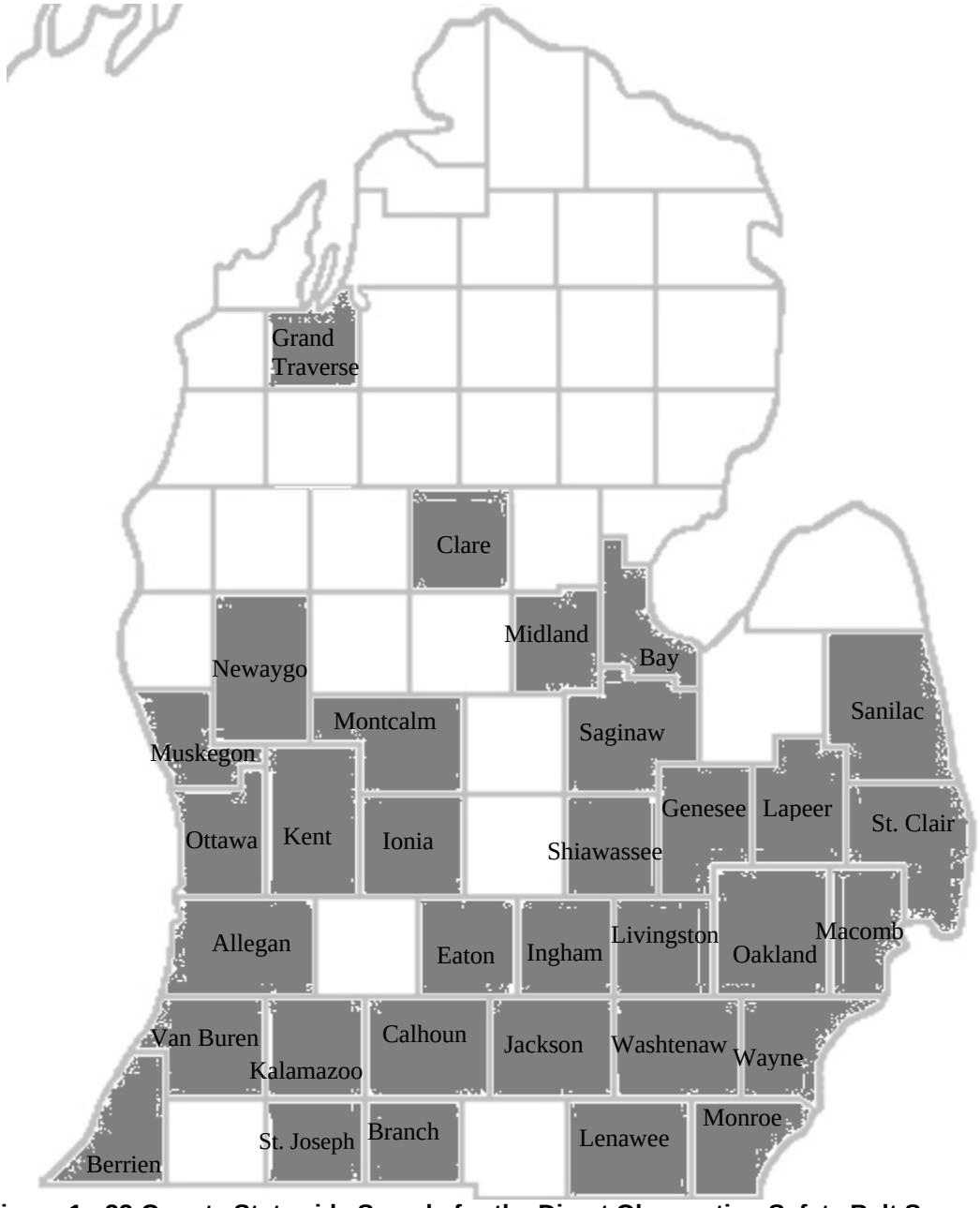

Figure 1: 33-County Statewide Sample for the Direct Observation Safety Belt Surveys

3.1 Sample Size and Precision

A standard error of less than 2.5 percent for the seat belt use estimates is required by the Final Rule. Since 1999, Michigan has conducted the Michigan Annual Seat Belt Use Study, and has historically obtained standard errors below this threshold (e.g. most recently 0.4 percent in 2014) via observed sample sizes of approximately 25,000 vehicles. Since the proposed design for the 2015 Post-CIOT survey was identical to the 2014 Annual survey, it was expected that the sample size for the 2015 Post-CIOT Survey would be similar to the 2014 Annual Survey and the precision objective was expected to be

achieved. In the event that the precision objective was not met, additional observations would be taken starting with those sites having the fewest observations. New data would be added to existing data until the desired precision was achieved.

Within each of these four belt use groups, a total of 50 road segments were selected. Michigan employed the Census TIGER data for the selection of road segments. Michigan exercised the available exclusion option and removed rural local roads in counties not within Metropolitan Statistical Areas (MSAs), and other non-public roads, unnamed roads, unpaved roads, vehicular trails, access ramps, cul-de-sacs, traffic circles, and service drives from the dataset. The number of road segments selected within each MTFCC class was determined proportionately based upon total annual VMT within the three classes (Primary, Secondary, and Local). Thus, the segments selected ultimately included 15 Primary roads (20 percent of sample), 30 Secondary roads (60 percent of sample), and 5 Local roads (10 percent of sample).

Prior to selecting the specific observation locations, all road segments were explicitly stratified by MTFCC (primary, secondary and local) within each of the four belt use rate groups and implicitly stratified by county and by segment length to obtain an ordered list. Implicit stratification by county was done to ensure adequate geographic coverage was obtained as a part of the selection process. Similarly, the implicit stratification by length ensured representative coverage within each MTFCC class since higher-class roads tended to be longer than lower-class roads. Specific road segments were then selected with probability proportional to size (PPS) using segment length as the measure of selection (MOS).
As such, the inclusion probability for a specific road segment is:

$$\pi_{h|gc} = n_{gc}\, l_h / \sum_{\forall h} l_h,$$

where n_{gc} is the road segment sample size for MTFCC *c* in stratum g that was allocated, l_h is the length of road segment h, and

$$\sum_{\forall h} l_h$$

is the total length of all segments in stratum g and MTCFF *c*. If a segment was selected with certainty (i.e., its MOS was equal to or exceeded $\sum_{\forall h} l_h / n_{gc}$), it was set aside as a certainty selection and the probabilities of selection were recalculated for the remaining segments in the MTCFF class. This was repeated and the certainty selections were identified successively until no segment's MOS was equal to or exceeded the re-calculated $\sum_{\forall h} l_h / n_{gc}$. After each certainty segment was removed, the total segment length of the MTCFF class was then recalculated, as well as the probabilities of selection for the remaining segments, until no more segments were selected with certainty.

After all certainty segments were identified, a sampling interval (*I*) was calculated as the total length across all road segments within each MTFCC group divided by the number of road segments to select within each group (i.e., 15 primary, 30 secondary, and 5 local). A random start (RS) was selected between 0 and the calculated *I*, which determined the first road segment selected. Subsequent road segments selected were determined by adding multiples of *I* to the RS until the desired number of road segments were selected and/or the end of the sorted list was reached.

Table 4 presents summary statistics detailing the number of eligible road segments, the total length (miles) of these segments, and the number of road segments selected within each of the MTFCC classes by belt use group and county.

Appendix III presents the complete list of the final observation sites including belt use stratum, county, and road classification.

Table 4. Roadway Functional Strata by County, Road Segments Population (N), Length of Selected Segments (miles), and Number of Segments Selected (n)

Strata	County		MTFCC Strata			Total
			Primary	Secondary	Local	
1	Ingham	N	37	147	6162	6346
		Length	169	417	3111	3697
		n	3	7	1	11
	Kalamazoo	N	46	71	6611	6728
		Length	171	284	3433	3888
		n	4	5	0	9
	Oakland	N	40	172	29104	29316
		Length	349	556	10287	11192
		n	5	13	3	21
	Washtenaw	N	19	76	8183	8278
		Length	116	268	3841	4225
		n	3	5	1	9
2	Allegan	N	14	52	4416	4482
		Length	161	287	3656	4104
		n	1	3	1	5
	Bay	N	19	111	3580	3710
		Length	253	330	2568	3151
		n	2	3	0	5
	Calhoun	N	11	110	4937	5058
		Length	156	291	3200	3647
		n	2	2	1	5
	Eaton	N	11	88	3002	3101
		Length	182	368	2497	3047
		n	2	4	0	6
	Grand Traverse	N	0	55	5485	5540
		Length	0	236	2731	2967
		n	0	2	0	2
	Jackson	N	8	142	5203	5353
		Length	108	416	3104	3628
		n	1	4	1	6
	Kent	N	29	142	15063	15234
		Length	285	633	6841	7759
		n	4	5	1	10
	Livingston	N	17	41	7119	7177
		Length	101	211	3267	3579
		n	1	2	0	3
	Midland	N	3	28	3481	3512
		Length	1	106	2285	2392
		n	0	1	1	2
	Monroe	N	7	55	3531	3593
		Length	145	291	2760	3196
		n	2	3	0	5
	Ottawa	N	3	52	7080	7135
		Length	4	220	3417	3641
		n	0	1	0	1
3	Barry	N	1	132	2894	3027
		Length	0	237	2148	2385
		n	0	0	0	0
	Berrien	N	37	107	6495	6639
		Length	72	390	3121	3583
		n	3	0	0	3
	Branch	N	6	37	2231	2274
		Length	133	184	1844	2160
		n	1	0	0	1
	Cass	N	2	74	2850	2926
		Length	0	213	1844	2057
		n	0	0	0	0
	Clare	N	10	65	4408	4483
		Length	101	193	2532	2826
		n	2	0	0	2

Table 4 - Roadway Functional Strata by County, Road Segments Population (N), Length of Selected Segments (miles), and Number of Segments Selected (n) (Continued)

Strata	County		MTFCC Strata			Total
			Primary	Secondary	Local	
3	Clinton	N	28	78	2277	2383
		Length	71	185	2494	2750
		n	0	0	0	0
	Genesee	N	18	78	9622	9718
		Length	357	409	4674	5440
		n	2	0	0	2
	Gratiot	N	3	37	1641	1681
		Length	46	147	2205	2398
		n	0	0	0	0
	Hillsdale	N	0	76	2150	2226
		Length	0	346	2196	2541
		n	0	0	0	0
	Ionia	N	8	78	2376	2462
		Length	73	234	2205	2512
		n	0	0	1	1
	Lapeer	N	3	31	2883	2917
		Length	144	216	3129	3490
		n	0	1	0	1
	Lenawee	N	1	104	3398	3503
		Length	1	378	2666	3045
		n	0	3	1	4
	Montcalm	N	4	73	4095	4172
		Length	63	380	4041	4484
		n	0	4	0	4
	Muskegon	N	5	44	5660	5709
		Length	90	196	3033	3319
		n	0	1	1	2
	Newaygo	N	0	104	3441	3545
		Length	0	360	3042	3402
		n	0	4	0	4
	Saginaw	N	8	149	5252	5409
		Length	154	633	4327	5114
		n	2	5	1	8
	Sanilac	N	1	88	2208	2297
		Length	0	495	2912	3407
		n	0	5	0	5
	Shiawassee	N	6	32	2276	2314
		Length	50	206	2113	2369
		n	1	1	1	3
	St. Clair	N	22	121	4189	4332
		Length	182	329	2975	3486
		n	3	3	0	6
	St. Joseph	N	1	66	3147	3214
		Length	0	295	2550	2846
		n	0	3	0	3
	Tuscola	N	0	88	2061	2149
		Length	0	402	2971	3373
		n	0	0	0	0
	Van Buren	N	8	27	3512	3547
		Length	189	89	2843	3121
		n	1	0	0	1
	Wexford	N	0	65	3274	3339
		Length	0	299	2458	2757
		n	0	0	0	0
4	Macomb	N	14	203	16727	16944
		Length	67	427	5545	6039
		n	4	15	3	22
	Wayne	N	50	180	26982	27212
		Length	690	982	12387	14059
		n	11	15	2	28

In the event an original road segment was permanently unavailable, a reserve road segment was to be used. The reserve road segment sample consisted of one additional road segment per original road segment selected, resulting in a reserve sample of an additional 200 road segments. These reserve segments were identified and selected as the road segments immediately following the original road segment actually selected. Thus, these segments were also explicitly stratified by seat belt use and MTFCC group, as well as implicitly stratified by segment length and county. Each reserve segment corresponded to an original road segment actually selected. Thus, these are considered selected with PPS using road segment length as MOS by the same approach as described previously. As such, for the purposes of data weighting, the reserve road segment inherited all probabilities of selection and weighting components up to and including the road segment stage of selection from the original road segment actually selected. Probabilities and weights for any subsequent stages of selection (e.g., the sampling of vehicles) would be determined by the reserve road segment itself.

Road segments were mapped according to the latitude and longitude of their midpoints. The selected road segment was identified by an intersection or interchange that occurred within or just beyond the segment. Data collection sites were deterministically selected such that traffic would be moving during the observation period. Therefore, sites were assigned to locations within the segment that were 50 to 150 feet from any controlled intersections. For limited access roadways, data collection occurred on a ramp carrying traffic exiting the highway. The observed direction of travel was randomly assigned for each road segment. The locations of the data collection sites were described on site assignment sheets and GPS coordinates were determined for the approximate location at which the observer was to stand. The GPS coordinates also allowed for efficient navigation to each observation site to assist the Data Collectors and QC Monitors travelling to the assigned locations.

3.2 Outline for Data Collection

For each selected observation site, vehicles were observed for exactly 60 minutes. These observations were appropriately weighted, as explained in the Data Analysis Section of this report (Section 6.0). The data collected for the 200 observation sites provided a representative sample for each day of the week and each hour of the day for the safety belt use characteristics of the state.

The driver of each vehicle and the passenger in the front-right seat of the vehicle were observed for safety belt use, non-use, and misuse. The driver and passenger belt observation categories included ‘belted correctly’, ‘not belted correctly’, and ‘unknown belt use’ as previously described. An occupant was recorded as ‘belted correctly’ only if they were observed to be properly using the shoulder belt (i.e. shoulder belt was across chest; not under arm or behind back). The ‘unknown belt use’ category was marked if an observer was unable to determine the position of an occupant’s seat belt. These observations were not included in the final sample but a record was kept to calculate the non-response rate which is discussed in the data analysis section of this report. In the surveys, both the driver and

front-seat passenger were separately identified based upon their gender, estimated age, and race. The driver and passenger gender categories consisted of male, female, and unknown. The driver age categories included 16-29, 30-59, 60 and over, and unknown. The passenger age categories included 0-15, 16-29, 30-59, 60 and over, and unknown. The driver and passenger races were categorized as Caucasian, African American, other, or unknown. The vehicles were categorized into four groups: Passenger Cars, Sport Utility Vehicles, Vans or Minivans, and Pick-Up Trucks. The vehicles were also identified as being Commercial or Non-commercial vehicles. Furthermore, the driver was also observed for any indication of cell phone use. The categories included 'handheld (talking)', 'handheld (typing)', 'hands-free (ear piece)', and hands-free (no ear piece)'. For cases where a driver was observed to be using a 'hands-free' electronic device, observers also recorded whether an earpiece was visible or not.

Data collectors also counted every vehicle that passed through the lanes they were observing during the 60-minute observation using a hand counter. This volume count was then utilized during the belt use weighting procedure. Observations were manually recorded in the field on survey forms and returned back to the office within 24 hours of the data collection, or as soon as possible after multiple day trips to outstate locations. The data collected in the field were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy in the office by office staff.

4.0 OBSERVER TRAINING

The Principal Investigator and co-Investigators from WSU served as the QC Monitors, conducting site audits of the Data Collectors. Each Data Collector was monitored at least once by a QC Monitor. The Data Collectors were comprised of WSU staff, many of whom have participated in prior safety restraint use surveys. All data collectors were able to stand for long periods of time, work outdoors, and successfully complete the training program. The training program for Data Collectors was conducted at WSU, beginning approximately two weeks prior to the first data collection period and included both lecture and classroom and field exercises. The syllabus for the training program is shown as Figure 2.

At the conclusion of the classroom training, the Data Collectors conducted their first field practice at a location near the WSU campus. QC Monitors will be available during this period to respond to questions and offer assistance to Data Collectors as needed. Reliability and repeatability field data collection practice continued during the two weeks leading up to full-scale survey implementation.

Day 1 – In-Class Training Program and Field Practice

Welcome, introductions, and distribution of materials

Survey overview

Scheduling and rescheduling
- Site Assignment Sheet
- Observation periods
- Temporary impediments such as weather
- Permanent impediments at data collection sites

Site locations
- Locating assigned sites
- Alternate site selection
- Interstate ramps and surface streets
- Direction of travel/number of observed lanes

Data collection techniques
- Definitions of belt/booster seat use, passenger vehicles
- Observation protocol: belt use, vehicle type/use, demographic characteristics
- Unobservable vehicles/occupants

Data collection forms
- Cover sheet
- Recording alternate site information
- Recording observations

Data entry procedures

Travel reports, lodging, and auto reservations

Field practice at ramps and surface streets

Days 2-10 Continued Field Practice

Field practice at ramps and surface streets

Figure 2. Training Syllabus

The reliability and repeatability studies were performed at various intersections near the Wayne State University campus, as well as additional locations in southeastern Michigan. These intersections represented various site characteristics that could be challenging for observational data collection. Over a period of several weeks, observers were randomly divided into groups and assigned to collect safety belt observational data independently. Also during this period, another exercise paired inexperienced

observers with experienced observers, who noted which individual vehicle the entire group was to evaluate. This allowed an analysis of the accuracy of the inexperienced data collectors in comparison to those who have participated in the study previously.

The data was then summarized and compared among the observers in each group to determine the accuracy of their observations. Upon completion of the training for the data collection, each member of the data collection team received a training manual composed of the information detailed during the training session, the schedule of data collection, and all necessary field supplies.

5.0 QUALITY CONTROL

The policies and procedures utilized during the conduct of the direct observation surveys of safety belt use were based upon the *Uniform Criteria for State Observational Surveys of Seat Belt Use* from Title 23, Part 1240.12 of the Code of Federal Regulations. The study design for the Post-Click It or Ticket (CIOT) Survey was consistent with these criteria, which established observations should be conducted on specific dates and times and in particular directions of travel, all of which were determined randomly in advance of the studies. Further, the criteria state policies should be in place in the event observations cannot be made due to unanticipated events, such as road construction. In such situations, data collectors were instructed to observe at the pre-assigned alternate location. Policies must also be established for the case where traffic flow is too heavy to observe all vehicles or traffic is moving too quickly for observation. In most instances, high traffic volumes prohibit data collectors from observing all vehicles. Consequently, data collectors were instructed to observe as many vehicles as is feasible for observation under such conditions for the required time period of 60 minutes.

All belt use observations were conducted during weekdays and weekends between 7 a.m. and 7 p.m. The schedule included rush hour (before 9:30 AM and after 3:30 PM) and non-rush hour observations. Data collection was conducted for 60 minutes at each site, and approximately five sites were scheduled each day for each Data Collector. Start times and days were staggered to ensure all days of the week and hours of the day (during daylight) were represented in the sample.

Site assignment sheets were provided to the Data Collectors and QC Monitors. These indicated the observed road name, the crossroad included within the road segment (or nearest crossroad), GPS coordinates, assigned date, assigned time, and assigned direction of travel. Sites within relatively close geographic proximity were assigned as data collection clusters. The first site within each cluster was assigned a random day and time for completion. All other sites within a cluster were assigned to the same day in order to minimize travel costs. The sites were scheduled by geographic proximity to minimize travel within the cluster.

During the full-scale data collection activities, independent auditors were sent out to the field to covertly observe the data collectors. These field audits were conducted to ensure compliance with the data collection procedures. No major violations of policies or procedure were observed as a part of these audits. The random checks were conducted at least once for each observer and a total of ten sites were audited, representing five percent of all observational sites.

6.0 DATA ANALYSIS

The data collected in the field were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy by office staff. Rates for safety belt and cell phone use were determined for each survey stratum, county, location, etc., as well as the statewide average. A 95-percent confidence interval for each use rate estimate was determined according to the NHTSA guidelines. The following sections outline the methods used to estimate the use rate and variance for safety belts. A similar procedure was utilized to estimate cell phone use rate and variance.

6.1 Imputation

No imputation was done on missing data.

6.2 Sampling Weights

The following is a summary of the notation used in this section.

g – Subscript for belt use group strata

h – Subscript for road segment strata

i – Subscript for road segment

j – Subscript for time segment

k – Subscript for road direction

l – Subscript for lane

m – Subscript for vehicle

n – Subscript for front-seat occupant

Under this stratified multistage sample design, the inclusion probability for each observed vehicle was the product of selection probabilities at all stages: π_g for belt use group (stratum-road class), $\pi_{ht|g}$ for road segment, $\pi_{j|ght}$ for time segment, $\pi_{k|ghtf}$ for direction, $\pi_{l|ghtfk}$ for lane, and $\pi_{m|ghtfkl}$ for vehicle. So the overall vehicle inclusion probability was:

$$\pi_{ghtfklm} = \pi_g \pi_{ht|g} \pi_{j|ght} \pi_{k|ghtf} \pi_{l|ghtfk} \pi_{m|ghtfkl}.$$

The sampling weight (design weight) for vehicle *m* is:

$$w_{ghtfkim} = \frac{1}{\pi_{ghtfkim}}$$

6.3 Non-Responding Site Adjustment

There were no sites which required 'non-responding' adjustment in the 2015 Post-Click It Or Ticket Direct Observation Survey of Safety Belt Use.

6.4 Estimators

Noting all front-seat occupants were observed, the driver/passenger seat belt use status was:

$$y_{ghtfkimn} = \begin{cases} 1, if\ belt\ used \\ 0, otherwise \end{cases}$$

In order to most accurately estimate the weighted safety belt use rate for the entire state of Michigan, the estimator used in this analysis was weighted by segment length and stratum-level VMT to determine the overall statewide belt use rate. This estimation technique is detailed in *An Example of a Compliant State Seat Belt Use Survey Design* [7]. Under this estimator, the use rates within each stratum were first calculated using the road segment length based estimator:

$$p_{t_{gh}} = \frac{\sum_{all\ tfkimn\ in\ gh} w_{tfkim|gh} Length_{ght} y_{ghtfkimn}}{\sum_{all\ tfkimn\ in\ gh} w_{tfkim|gh} Length_{ght}}$$

The twelve stratum-specific use rates were then weighted by the proportion of total statewide VMT (shown in Table 5) within each stratum, which resulted in the road class VMT-based estimator (p_{VMT}):

$$p_{VMT} = \frac{\sum_g w_g \sum_h VMT_{gh} p_{gh}}{\sum_g w_g \sum_h VMT_{gh}}$$

Table 5. Annual Vehicle Miles of Travel by Stratum (in 1,000s)

Belt Use Stratum	Road Class			Total
	Primary	Secondary	Local	
1	7,185,332	11,192,309	2,154,320	20,531,961
2	7,259,795	11,279,604	1,735,649	20,275,047
3	5,734,226	11,911,091	1,936,706	19,582,024
4	7,227,481	12,389,812	2,330,291	21,947,584
Statewide	**27,406,834**	**46,772,815**	**8,156,966**	**82,336,616**

The use of the VMT-based estimator (p_{VMT}) reduced the weighting bias towards local road observation sites by accounting for their relatively short length and low VMT as compared to primary and secondary roads.

6.5 Variance Estimation

The variance (and standard error) for each estimator was determined using the "Delete-1 Jackknife" variance estimation program in SUDAAN 11 software. Under this methodology, the variance was calculated by deleting one observation location and adjusting the weights of the remaining PSU's in the same stratum to account for the deleted PSU. The procedure was repeated, removing each location once. For the road class VMT based estimator (p_{VMT}), the "Delete-1 Jackknife" method was used to estimate the variances within each of the road class/belt use strata:

$$V(p_{gh}) = \left(\frac{n_{gh}-1}{n_{gh}}\right)\sum_{i=1}^{n_{gh}}(p_{ghi}-p_{gh})(p_{ghi}-p_{gh})'$$

where:

$V(p_{gh})$ = Estimated variance within each of the road class/belt use strata

p = Estimated statewide belt use rate

p_{ghi} = Estimated belt use rate at location *i* in road segment type *h* in belt use group *g*

p_{gh} = Estimated belt use rate in road segment type *h* in belt use group *g*

n_{gh} = Number of locations of road segment type *h* in belt use group *g*

The variance for the statewide use rate was then determined using the following equation:

$$V(p) = \frac{\sum_{\forall g,\forall h} VMT_{gh}^2 V(p_{gh})}{\left(\sum_{\forall g,\forall h} VMT_{gh}\right)^2}$$

where:

$V(p)$ = Estimated variance of statewide belt use rate

The standard error of the statewide use rate was found by simply taking the square root of the estimated variance. The 95 percent confidence interval of the statewide belt use was equal to the weighted safety belt use rate plus/minus 1.96 (for the Z-test at alpha = 0.05) multiplied by the standard error expressed as a percent.

6.6 Non-Response Rate

According to NHTSA's guidelines, the non-response rate for the annual safety belt survey cannot exceed 10 percent. A non-response occurs when the observer was not able to determine the safety belt use of a front seat vehicle occupant. This can occur due to a variety of reasons such as tinted windows, sun glare, high speeds of the vehicle in question, etc... Observers in the field marked either 'vehicle not observable' or 'unknown belt use' to keep a record of the non-response rate. There were a total of 350 non-response observations which represents approximately 0.1 percent of the total number of

observations. This non-response rate was below the allowable maximum of 10 percent established by the NHTSA.

7.0 RESULTS AND CONCLUSIONS

The Post-Click It or Ticket (CIOT) Direct Observation Survey was performed between Tuesday, May 26th and Monday, June 8th of 2015. During this observation period, a total of 27,078 vehicles were observed resulting in 33,973 driver and right-front passenger observations at the 200 observation sites randomly selected to represent statewide safety belt use.

7.1 Safety Belt Survey Results and Conclusions

The overall weighted statewide safety belt use rate for Michigan was found to be 92.8 percent and is shown in Table 6. The overall weighted statewide safety belt use rate was calculated based upon the procedure described in the Data Analysis section (Section 6.0) of this report. When the safety belt usage rates were calculated, belted occupants included all drivers and front-seat passengers who were belted correctly. The "not belted" occupants included drivers and front-seat passengers who were not belted or who were wearing the belt incorrectly; either under their arm or behind their back. Details of the observations on an intersection level are provided in Appendix III. It should be noted that all of the observation sites were original sites, as there were no instances in which the original site was unobservable and the data collector had to move to an alternate site.

Table 6: Statewide Weighted Safety Belt Use Rate for Drivers and Front-Seat Passengers

Observational Wave	Safety Belt Use Rate*	Standard Error
Post-Click It or Ticket Observational Survey	92.8% ± 0.8%	0.4%

* Weighted Safety Belt Usage ± 95% Confidence Band

The overall statewide use rate is representative of all front seat occupants (drivers and right-front passengers), all times of the day (7:00 AM-7:00 PM) and all days of the week. Table 7 shows the raw (unweighted) safety belt use information separated by drivers and front-right passengers. Table 8 summarizes the descriptive statistics for the safety belt survey in terms of sampling statistics for day of the week and time of the day.

Table 7. Statewide Raw/Unweighted Safety Belt Use Summary

Belt Use	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Drivers	27,078	25,505	94.2%
Passengers	6,895	6,202	90.0%
Total	**33,973**	**31,707**	**93.3%**

Table 8. Statewide Safety Belt Use Day and Time Sampling Summary

Day of the Week	Post-CIOT Safety Belt Observations			
	No. of Sites Observed	Percent of Sites in Day of Week	Actual Total No. of Observations (Occupants)	Percent of Observations in Day of Week (Occupants)
Sunday	22	11.0%	4,075	12.0%
Monday	25	12.5%	4,865	14.3%
Tuesday	25	12.5%	3,450	10.2%
Wednesday	29	14.5%	4,484	13.2%
Thursday	36	18.0%	6,191	18.2%
Friday	29	14.5%	5,510	16.2%
Saturday	34	17.0%	5,398	15.9%
Total	**200**	**100.0%**	**33,973**	**100.0%**
Time of the Day	**Post-CIOT Safety Belt Observations**			
	No. of Sites Observed	**Percent of Sites in Time of Day**	**Actual Total No. of Observations (Occupants)**	**Percent of Observations in Day of Week (Occupants)**
7 am – 8 am	10	5.0%	1,421	4.2%
8 am – 9 am	12	6.0%	2,208	6.5%
9 am – 10 am	15	7.5%	2,127	6.3%
10 am – 11 am	25	12.5%	4,023	11.8%
11 am – 12 pm	18	9.0%	3,284	9.7%
12 pm – 1 pm	22	11.0%	3,458	10.2%
1 pm – 2 pm	23	11.5%	3,171	9.3%
2 pm – 3 pm	19	9.5%	2,973	8.8%
3 pm – 4 pm	17	8.5%	3,231	9.5%
4 pm – 5 pm	15	7.5%	3,390	10.0%
5 pm – 6 pm	15	7.5%	3,297	9.7%
6 pm – 7 pm	9	4.5%	1,390	4.1%
Total	**200**	**100.0%**	**33,973**	**100.0%**

The safety belt use rate can be described by the overall use rate, as well as by vehicle type and various demographics. It should be noted the overall safety belt use rates presented in Table 7 and Tables 9 through 15 represent the raw (un-weighted) safety belt use data and vary from the weighted statewide use rate presented in Table 6. Table 9 summarizes the statewide driver and front-seat passenger safety belt use rates by county and belt-use stratum. Because of the relatively low number of sites and/or observations in many counties, the safety belt use rates listed may not be fully representative of each county.

Table 9. Statewide Safety Belt Use Rates by Stratum and County

STRATUM 1	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Ingham County	2,449	2,352	96.0%
Kalamazoo County	1,436	1,367	95.2%
Oakland County	4,331	3,976	91.8%
Washtenaw County	1,647	1,561	94.8%
Total	**9,863**	**9,256**	**93.8%**
STRATUM 2	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Allegan County	923	885	95.9%
Bay County	361	341	94.5%
Calhoun County	664	604	91.0%
Eaton County	836	777	92.9%
Grand Traverse County	350	329	94.0%
Jackson County	971	887	91.3%
Kent County	1,852	1,790	96.7%
Livingston County	303	280	92.4%
Midland County	148	128	86.5%
Monroe County	727	680	93.5%
Ottawa County	355	347	97.7%
Total	**7,490**	**7,048**	**94.1%**
STRATUM 3	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Branch County	484	436	90.1%
Berrien County	114	103	90.4%
Clare County	271	242	89.3%
Genesee County	266	247	92.9%
Ionia County	11	8	72.7%
Lapeer County	12	11	91.7%
Lenawee County	358	331	92.5%
Montcalm County	900	854	94.9%
Muskegon County	582	568	97.6%
Newaygo County	958	933	97.4%
Saginaw County	1,129	1,080	95.7%
Sanilac County	1,082	963	89.0%
Shiawassee County	220	211	95.9%
St. Clair County	1,002	947	94.5%
St. Joseph County	441	394	89.3%
Van Buren County	27	24	88.9%
Total	**7,857**	**7,352**	**93.6%**
STRATUM 4	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Macomb County	3,712	3,372	90.8%
Wayne County	5,051	4,679	92.6%
Total	**8,763**	**8,051**	**91.9%**
Grand Total (Unweighted)	**33,973**	**31,707**	**93.3%**

Stratum 2 displayed the highest safety belt use rate, followed closely by Strata 1 and 3. Stratum 4 displayed the lowest safety belt use rate, which follows historical trends. Tables 10 through 14 summarize occupant safety belt use for drivers and front-seat passengers by vehicle type for each day of the week, time of the day, gender, age, and race for the Post-Click It or Ticket Observation Survey.

Table 10. All Vehicles Statewide Summary

Day of the Week	All Vehicle Safety Belt Use		
	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	4,075	3,768	92.5%
Monday	4,865	4,574	94.0%
Tuesday	3,450	3,149	91.3%
Wednesday	4,484	4,123	91.9%
Thursday	6,191	5,897	95.3%
Friday	5,510	5,186	94.1%
Saturday	5,398	5,010	92.8%
Total	**33,973**	**31,707**	**93.3%**
Time of the Day	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am – 8 am	1,421	1,347	94.8%
8 am – 9 am	2,208	2,033	92.1%
9 am – 10 am	2,127	2,017	94.8%
10 am – 11 am	4,023	3,754	93.3%
11 am – 12 pm	3,284	3,087	94.0%
12 pm – 1 pm	3,458	3,154	91.2%
1 pm – 2 pm	3,171	2,918	92.0%
2 pm – 3 pm	2,973	2,812	94.6%
3 pm – 4 pm	3,231	2,958	91.6%
4 pm – 5 pm	3,390	3,165	93.4%
5 pm – 6 pm	3,297	3,163	95.9%
6 pm – 7 pm	1,390	1,299	93.5%
Total	**33,973**	**31,707**	**93.3%**
Vehicle Type	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Passenger Cars	14,574	13,651	93.7%
Sport Utility	9,959	9,398	94.4%
Vans/Minivans	3,956	3,740	94.5%
Pick-Up Trucks	5,484	4,918	89.7%
Total	**33,973**	**31,707**	**93.3%**
Gender	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	18,960	17,555	92.6%
Female	14,885	14,031	94.3%
Unknown	128	121	94.5%
Total	**33,973**	**31,707**	**93.3%**
Age	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0 - 15	2,656	2,333	87.8%
16 - 29	10,719	9,886	92.2%
30 - 59	16,679	15,742	94.4%
60+	3,845	3,676	95.6%
Unknown	74	70	94.6%
Total	**33,973**	**31,707**	**93.3%**
Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	29,748	27,893	93.8%
African-American	3,388	3,034	89.6%
Other	769	714	92.8%
Unknown	68	66	97.1%
Total	**33,973**	**31,707**	**93.3%**

Table 11. Passenger Cars Statewide Summary

Passenger Cars Safety Belt Use			
Day of the Week	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	1,960	1,797	91.7%
Monday	2,119	2,002	94.5%
Tuesday	1,570	1,434	91.3%
Wednesday	1,931	1,797	93.1%
Thursday	2,645	2,530	95.7%
Friday	2,048	1,949	95.2%
Saturday	2,301	2,142	93.1%
Total	**14,574**	**13,651**	**93.7%**
Time of the Day	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am – 8 am	664	622	93.7%
8 am – 9 am	870	801	92.1%
9 am – 10 am	898	855	95.2%
10 am – 11 am	1,727	1,618	93.7%
11 am – 12 pm	1,284	1,218	94.9%
12 pm – 1 pm	1,592	1,458	91.6%
1 pm – 2 pm	1,346	1,244	92.4%
2 pm – 3 pm	1,265	1,207	95.4%
3 pm – 4 pm	1,402	1,293	92.2%
4 pm – 5 pm	1,476	1,384	93.8%
5 pm – 6 pm	1,421	1,364	96.0%
6 pm – 7 pm	629	587	93.3%
Total	**14,574**	**13,651**	**93.7%**
Gender	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	7,623	7,127	93.5%
Female	6,887	6,463	93.8%
Unknown	64	61	95.3%
Total	**14,574**	**13,651**	**93.7%**
Age	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0 - 15	975	833	85.4%
16 - 29	5,431	5,019	92.4%
30 – 59	6,443	6,142	95.3%
60+	1,693	1,626	96.0%
Unknown	32	31	96.9%
Total	**14,574**	**13,651**	**93.7%**
Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	12,212	11,530	94.4%
African-American	1,936	1,721	88.9%
Other	394	369	93.7%
Unknown	32	31	96.9%
Total	**14,574**	**13,651**	**93.7%**

Table 12. Sport Utility Vehicles Statewide Summary

Sport Utility Vehicles Safety Belt Use			
Day of the Week	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	1,327	1,242	93.6%
Monday	1,501	1,418	94.5%
Tuesday	939	871	92.8%
Wednesday	1,203	1,119	93.0%
Thursday	1,777	1,711	96.3%
Friday	1,575	1,516	96.3%
Saturday	1,637	1,521	92.9%
Total	**9,959**	**9,398**	**94.4%**
Time of the Day	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am – 8 am	389	378	97.2%
8 am – 9 am	690	652	94.5%
9 am – 10 am	638	611	95.8%
10 am – 11 am	1,223	1,139	93.1%
11 am – 12 pm	944	892	94.5%
12 pm – 1 pm	959	905	94.4%
1 pm – 2 pm	950	886	93.3%
2 pm – 3 pm	803	762	94.9%
3 pm – 4 pm	999	927	92.8%
4 pm – 5 pm	927	872	94.1%
5 pm – 6 pm	1,005	967	96.2%
6 pm – 7 pm	432	407	94.2%
Total	**9,959**	**9,398**	**94.4%**
Gender	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	4,747	4,454	93.8%
Female	5,177	4,911	94.9%
Unknown	35	33	94.3%
Total	**9,959**	**9,398**	**94.4%**
Age	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0 - 15	702	636	90.6%
16 - 29	3,062	2,833	92.5%
30 – 59	5,113	4,886	95.6%
60+	1,065	1,026	96.3%
Unknown	17	17	100.0%
Total	**9,959**	**9,398**	**94.4%**
Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	8,768	8,320	94.9%
African-American	946	853	90.2%
Other	232	212	91.4%
Unknown	13	13	100.0%
Total	**9,959**	**9,398**	**94.4%**

Table 13. Van/Minivan Statewide Summary

Van/Minivans Safety Belt Use			
Day of the Week	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	368	342	92.9%
Monday	544	516	94.9%
Tuesday	439	412	93.8%
Wednesday	509	478	93.9%
Thursday	798	768	96.2%
Friday	673	633	94.1%
Saturday	625	591	94.6%
Total	**3,956**	**3,740**	**94.5%**
Time of the Day	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am – 8 am	158	151	95.6%
8 am – 9 am	282	266	94.3%
9 am – 10 am	260	250	96.2%
10 am – 11 am	392	368	93.9%
11 am – 12 pm	475	451	94.9%
12 pm – 1 pm	389	349	89.7%
1 pm – 2 pm	373	343	92.0%
2 pm – 3 pm	402	386	96.0%
3 pm – 4 pm	324	302	93.2%
4 pm – 5 pm	419	405	96.7%
5 pm – 6 pm	361	354	98.1%
6 pm – 7 pm	121	115	95.0%
Total	**3,956**	**3,740**	**94.5%**
Gender	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	2,188	2,048	93.6%
Female	1,758	1,682	95.7%
Unknown	10	10	100.0%
Total	**3,956**	**3,740**	**94.5%**
Age	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0 - 15	449	416	92.7%
16 - 29	948	892	94.1%
30 – 59	2,093	1,984	94.8%
60+	461	443	96.1%
Unknown	5	5	100.0%
Total	**3,956**	**3,740**	**94.5%**
Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	3,529	3,342	94.7%
African-American	327	303	92.7%
Other	91	86	94.5%
Unknown	9	9	100.0%
Total	**3,956**	**3,740**	**94.5%**

Table 14. Pick-Up Trucks Statewide Summary

Pick-up Truck Safety Belt Use			
Day of the Week	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Sunday	420	387	92.1%
Monday	701	638	91.0%
Tuesday	502	432	86.1%
Wednesday	841	729	86.7%
Thursday	971	888	91.5%
Friday	1,214	1,088	89.6%
Saturday	835	756	90.5%
Total	**5,484**	**4,918**	**89.7%**
Time of the Day	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
7 am – 8 am	210	196	93.3%
8 am – 9 am	366	314	85.8%
9 am – 10 am	331	301	90.9%
10 am – 11 am	681	629	92.4%
11 am – 12 pm	581	526	90.5%
12 pm – 1 pm	518	442	85.3%
1 pm – 2 pm	502	445	88.6%
2 pm – 3 pm	503	457	90.9%
3 pm – 4 pm	506	436	86.2%
4 pm – 5 pm	568	504	88.7%
5 pm – 6 pm	510	478	93.7%
6 pm – 7 pm	208	190	91.3%
Total	**5,484**	**4,918**	**89.7%**
Gender	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Male	4,402	3,926	89.2%
Female	1,063	975	91.7%
Unknown	19	17	89.5%
Total	**5,484**	**4,918**	**89.7%**
Age	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
0 - 15	530	448	84.5%
16 - 29	1,278	1,142	89.4%
30 – 59	3,030	2,730	90.1%
60+	626	581	92.8%
Unknown	20	17	85.0%
Total	**5,484**	**4,918**	**89.7%**
Race	Actual Total # of Obs.	Actual Belted # of Obs.	% Safety Belt Use
Caucasian	5,239	4,701	89.7%
African-American	179	157	87.7%
Other	52	47	90.4%
Unknown	14	13	92.9%
Total	**5,484**	**4,918**	**89.7%**

Occupants of vans or minivans exhibited the highest safety belt use rate among vehicle types at 94.5 percent. Occupants of sport utility vehicles and passenger cars exhibited a similar use rate of 94.4 percent and 93.7 percent, respectively. Occupants of pick-up trucks exhibited the lowest use rate at 89.7 percent. Tuesdays demonstrated the lowest safety belt usage rate were with 91.3 percent. Safety belt use rates were highest on Thursdays with a rate of 95.3 percent. The time period of 12:00 PM to 1:00 PM exhibited a lower usage rate than all other times of the day (91.2 percent), while occupants were mostly likely to wear their safety belts between the hours of 5:00 PM to 6:00 PM (95.9 percent).

Female occupants had higher use rates than male occupants by 1.7 percent (94.3 percent use rate for females vs. 92.6 percent use rate for males). The safety belt usage rate was highest among occupants aged 60 and older at 95.6 percent and lowest for occupants between the ages of 0 to 15 (87.8 percent). Safety belt use rates for occupants aged 16 to 29 were 92.2 percent while the use rate was 94.4 percent among occupants between 30 and 59. Safety belt usage was lowest among African American occupants (89.6 percent) and highest for Caucasian individuals (93.8 percent).

Table 15 summarizes occupant safety belt use rates by gender, age, and race. Vehicle occupants whose gender could not be identified were excluded from this demographic comparison (128 total observations). Young African American males aged 0 to 15, as well as Young African American females exhibited the lowest belt use rates of all demographic groups with use rates of 75.0 percent and 78.9 percent, respectively. Males aged 60 and over of other races (Hispanic, Asian, etc.) exhibited the highest safety belt use rate at 96.7 percent. Overall, young male pick-up truck occupants exhibited the lowest safety belt use rates, consistent with past findings.

Table 15. All Vehicles Statewide Demographic Summary

Demographic Data			All Vehicles Safety Belt Use		
Gender	**Age**	**Race**	**Actual Total # of Obs.**	**Actual Belted # of Obs.**	**% Safety Belt Use**
Male	0 - 15	Caucasian	357	321	89.9%
		African-American	44	33	75.0%
		Other	23	21	91.3%
		Unknown	2	1	50.0%
		Total	**426**	**376**	**88.3%**
	16 - 29	Caucasian	3,613	3,283	90.9%
		African-American	496	407	82.1%
		Other	128	118	92.2%
		Unknown	8	8	100.0%
		Total	**4,245**	**3,816**	**89.9%**
	30 - 59	Caucasian	10,069	9,419	93.5%
		African-American	1,065	967	90.8%
		Other	290	269	92.8%
		Unknown	20	19	95.0%
		Total	**11,444**	**10,674**	**93.3%**
	60+	Caucasian	2,669	2,527	94.7%
		African-American	100	91	91.0%
		Other	30	29	96.7%
		Unknown	3	3	100.0%
		Total	**2,802**	**2,650**	**94.6%**
	Unknown	Caucasian	41	37	90.2%
		African-American	1	1	100.0%
		Other	-	-	N/A
		Unknown	1	1	100.0%
		Total	**43**	**39**	**90.7%**
	TOTAL		**18,960**	**17,555**	**92.6%**

Table 15. All Vehicles Statewide Demographic Summary (Continued)

Demographic Data			All Vehicles Safety Belt Use		
Gender	**Age**	**Race**	**Actual Total # of Obs.**	**Actual Belted # of Obs.**	**% Safety Belt Use**
Female	0 - 15	Caucasian	299	274	91.6%
		African-American	38	30	78.9%
		Other	14	14	100.0%
		Unknown	2	2	100.0%
		Total	**353**	**320**	**90.7%**
	16 - 29	Caucasian	3,407	3,191	93.7%
		African-American	463	419	90.5%
		Other	107	101	94.4%
		Unknown	3	3	100.0%
		Total	**3,980**	**3,714**	**93.3%**
	30 - 59	Caucasian	7,084	6,727	95.0%
		African-American	1,050	962	91.6%
		Other	155	141	91.0%
		Unknown	12	12	100.0%
		Total	**8,301**	**7,842**	**94.5%**
	60+	Caucasian	2,090	2,002	95.8%
		African-American	117	111	94.9%
		Other	20	19	95.0%
		Unknown	2	2	100.0%
		Total	**2,229**	**2,134**	**95.7%**
	Unknown	Caucasian	20	19	95.0%
		African-American	1	1	100.0%
		Other	-	-	N/A
		Unknown	1	1	100.0%
		Total	**22**	**21**	**95.5%**
	TOTAL		**14,885**	**14,031**	**94.3%**

In comparison to 2014, the 2015 Post-CIOT survey revealed a slight increase in safety belt usage from 92.0 percent to 92.8 percent. In any case, continued public awareness and enforcement efforts are warranted to increase safety belt use. The careful evaluation of these media and enforcement efforts will allow for the identification of at-risk vehicle occupants and geographic areas prone to low belt use rates. As shown in this study, males and pick-up truck drivers continue to exhibit lower safety belt use rates. Generally, belt use was also lower for those counties that had a higher percentage of urban population. These areas should be emphasized in subsequent program efforts.

7.2 Electronic Device Use Results and Conclusions

As a part of the 2015 Post-CIOT observational survey of seatbelt use, cell phone use was also recorded for drivers only (passengers were not observed for cell phone use). A total of 1,977 drivers were observed using cell phones in some way and the overall weighted cell phone use rate was found to be 7.6%. The weighted cell phone use rate (shown in Table 16) was calculated using the same procedure as the weighted seatbelt rate described in the "Overall Statewide Safety Belt Calculations" section of the report. This rate represents a 2.6% decrease from the 10.2% cell phone use rate observed in 2014. Nationally, the overall cell phone use rate by drivers was found to be 8.36% in 2013 [8], which is the last year for which national data is available. This indicates Michigan's cell phone use rate is close to the national average. In addition to overall cell phone use, Table 17 presents driver cell phone use by device type and use type.

Table 16. Statewide Weighted Cell Phone Use Rate for Drivers

Use by Category	Use Rate*	Standard Error
Overall Cell Phone Use	**7.6% ± 0.6%**	**0.3%**

* Weighted Safety Belt Usage ± 95% Confidence Band

Table 17. Statewide Unweighted Cell Phone Use Rates by Use Type

Use by Category	Total # of Driver Observations	Total # of Drivers Observed Using Cell Phone	Percent of Cell Phone Use by Type (Drivers)
Talking – Handheld Device	27,078	1,336	4.9%
Talking – Hands-free Device (Earpiece Observed)	27,078	52	0.2%
Talking – Hands-free Device (Earpiece Not Observed)	27,078	37	0.1%
Typing - Handheld	27,078	552	2.0%
Overall Cell Phone Use	**27,078**	**1,977**	**7.3%**

Table 18 summarizes cell phone use for drivers in terms of day of the week, time of the day, vehicle type, gender, age and race. Females are more likely to use a cell phone while driving than males (8.8 percent and 6.4 percent, respectively). The electronic device use rate was found to be highest between 4pm and 6pm at 8.1 percent, while the cell phone use rate was lowest between 7am and 8am as well as 6pm and 7 pm (6.3 percent). Cell phone use among drivers less than 30 years of age was greatest at 10.6 percent, in comparison to 7.1 percent among those between ages 30 and 59 and 2.5 percent for drivers age 60 and above. African American drivers tended to exhibit higher cell phone use rates while driving as compared to other demographics.

Table 18. Cell Phone Use Statewide Summary

Day of the Week	All Vehicles Cell Phone Use		
	Total # of Driver Observations	Total # of Drivers Observed Using Cell Phone	Percent of Cell Phone Use (Drivers)
Sunday	3,032	188	6.2%
Monday	4,059	310	7.6%
Tuesday	2,850	214	7.5%
Wednesday	3,652	277	7.6%
Thursday	5,098	431	8.5%
Friday	4,332	280	6.5%
Saturday	4,055	277	6.8%
Total	**27,078**	**1,977**	**7.3%**
Time of the Day	**All Vehicles Cell Phone Use**		
	Total # of Driver Observations	**Total # of Drivers Observed Using Cell Phone**	**Percent of Cell Phone Use (Drivers)**
7 am - 8 am	1,277	81	6.3%
8 am - 9 am	1,843	141	7.7%
9 am - 10 am	1,724	124	7.2%
10 am - 11 am	3,171	213	6.7%
11 am - 12 pm	2,641	189	7.2%
12 pm - 1 pm	2,736	207	7.6%
1 pm - 2 pm	2,555	188	7.4%
2 pm - 3 pm	2,343	170	7.3%
3 pm - 4 pm	2,558	207	8.1%
4 pm - 5 pm	2,624	210	8.0%
5 pm - 6 pm	2,523	179	7.1%
6 pm - 7 pm	1,083	68	6.3%
Total	**27,078**	**1,977**	**7.3%**

Table 18. Cell Phone Use Statewide Summary (Continued)

Vehicle Type	All Vehicles Cell Phone Use		
	Total # of Driver Observations	Total # of Drivers Observed Using Cell Phone	Percent of Cell Phone Use (Drivers)
Passenger Cars	11,855	860	7.3%
Sport Utility	7,828	595	7.6%
Vans/ Minivans	2,952	225	7.6%
Pick-Up Trucks	4,443	297	6.7%
Total	**27,078**	**1,977**	**7.3%**
Gender	**All Vehicles Cell Phone Use**		
	Total # of Driver Observations	**Total # of Drivers Observed Using Cell Phone**	**Percent of Cell Phone Use (Drivers)**
Male	16,304	1,036	6.4%
Female	10,677	937	8.8%
Unknown	97	4	4.1%
Total	**27,078**	**1,977**	**7.3%**
Age	**All Vehicles Cell Phone Use**		
	Total # of Driver Observations	**Total # of Drivers Observed Using Cell Phone**	**Percent of Cell Phone Use (Drivers)**
16-29	6,511	692	10.6%
30-59	16,648	1,181	7.1%
60+	3,845	97	2.5%
Unknown	74	7	9.5%
Total	**27,078**	**1,977**	**7.3%**
Race	**All Vehicles Cell Phone Use**		
	Total # of Driver Observations	**Total # of Drivers Observed Using Cell Phone**	**Percent of Cell Phone Use (Drivers)**
Caucasian	23,756	1,689	7.1%
African American	2,697	247	9.2%
Other	579	34	5.9%
Unknown	46	7	15.2%
Total	**27,078**	**1,977**	**7.3%**

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APPENDIX I
Michigan Safety Belt Survey Cover Sheet and Data Collection Form

DIRECT OBSERVATION SURVEY COVER SHEET

Date: _____ - _____ - 2015 Observers Name:_____

Site Identification:

Site Location: _____

Site Number:_____

City_____County:_____Stratum_____

Alternate Site Information:

Is this an alternate site? No Yes
(Circle one)

If yes, please provide a reason for using an alternate site from the reserve list:

_____

Site Description:

Assigned traffic flow: North South East West

Number of lanes observed: _____

Total number of lanes in this direction: _____

Weather Conditions: Clear Light Fog Light Rain

Site Start and End Time (total obs. period must last EXACTLY 60 min):

Start time: _____am/pm End time: _____am/pm

Sample Sizes

60 Minute Volume Count (for lanes being observed): _____Vehicles

Number of Observations Recorded in 60 min: _____Vehicles

OBSERVATION DATA COLLECTION SHEET

SITE #________ OBSERVATION No.'s____ - ____ PAGE #_______

VEHICLE TYPE:			
□Passenger Car	□SUV	□Van/Minivan	□Pickup Truck

OBSERVABLE?	VEHICLE USE:	DRIVER CELL PHONE USE	
□Vehicle NOT Observable	□Non-Commercial □Commercial	□Handheld (Talking) □Handheld (Typing)	□Hands-free (E.P.) □Hands-free (NO E.P.)

DRIVER			
BELT USE:	AGE:	GENDER:	RACE:
□Belted	□16-29	□Male	□White
□Not Belted	□30-59	□Female	□Black
□Unknown	□60+	□Unknown	□Other
	□Unknown		□Unknown

□No Passenger	PASSENGER		
BELT USE:	AGE:	GENDER:	RACE:
□Belted	□0 to 15	□Male	□White
□Not Belted	□16-29	□Female	□Black
□Unknown	□30-59	□Unknown	□Other
	□60+		□Unknown
	□Unknown		

VEHICLE TYPE:			
□Passenger Car	□SUV	□Van/Minivan	□Pickup Truck

OBSERVABLE?	VEHICLE USE:	DRIVER CELL PHONE USE	
□Vehicle NOT Observable	□Non-Commercial □Commercial	□Handheld (Talking) □Handheld (Typing)	□Hands-free (E.P.) □Hands-free (NO E.P.)

DRIVER			
BELT USE:	AGE:	GENDER:	RACE:
□Belted	□16-29	□Male	□White
□Not Belted	□30-59	□Female	□Black
□Unknown	□60+	□Unknown	□Other
	□Unknown		□Unknown

□No Passenger	PASSENGER		
BELT USE:	AGE:	GENDER:	RACE:
□Belted	□0 to 15	□Male	□White
□Not Belted	□16-29	□Female	□Black
□Unknown	□30-59	□Unknown	□Other
	□60+		□Unknown
	□Unknown		

VEHICLE TYPE:			
□Passenger Car	□SUV	□Van/Minivan	□Pickup Truck

OBSERVABLE?	VEHICLE USE:	DRIVER CELL PHONE USE	
□Vehicle NOT Observable	□Non-Commercial □Commercial	□Handheld (Talking) □Handheld (Typing)	□Hands-free (E.P.) □Hands-free (NO E.P.)

DRIVER			
BELT USE:	AGE:	GENDER:	RACE:
□Belted	□16-29	□Male	□White
□Not Belted	□30-59	□Female	□Black
□Unknown	□60+	□Unknown	□Other
	□Unknown		□Unknown

□No Passenger	PASSENGER		
BELT USE:	AGE:	GENDER:	RACE:
□Belted	□0 to 15	□Male	□White
□Not Belted	□16-29	□Female	□Black
□Unknown	□30-59	□Unknown	□Other
	□60+		□Unknown
	□Unknown		

APPENDIX II
Resumes of Timothy J. Gates and Peter T. Savolainen

Dr. Timothy J. Gates

Summary

Dr. Timothy J. Gates is the current PI of the Direct Observation Survey of Safety Belt Use. Dr. Gates is an Associate Professor in the Wayne State University (WSU) Department of Civil and Environmental Engineering and part of the WSU-Transportation Research Group (WSU-TRG). As a member of the WSU-TRG, he has more than 6 years of experience with direct observation surveys of safety restraint use. This includes a diverse range of experiences in sample design and selection, field data collection methods, observer training, statistical systems development, and optimization techniques. He also has expertise in the areas of survey research methodology, data processing, and statistical quality control.

Education

Ph.D., Civil Engineering, University of Wisconsin, 2007
M.A., Civil Engineering, Michigan State University, 2000
B.S., Civil Engineering, Michigan State University, 2000

Professional Associations

American Society of Civil Engineers
Institute of Transportation Engineers

Computer Skills

Operation Systems: Windows, iOs
Software: LIMDEP, SAS, SPSS, SUDAAN, Microsoft PowerPoint, Excel and Word

Relevant Project Experience

Wayne State University (2007 to Present)

Direct Observation Surveys of Seat Belt Use –PI or co-PI on Michigan seat belt use survey, sponsored by funding through the Michigan Office of Highway Safety Planning (OHSP), from FY 2012 to present. Participated in proposal, planning, survey implementation, data collection, quality control, data analysis, and report preparation.

Direct Observation Surveys of Commercial Motor Vehicle Seat Belt Use – Co-PI on OHSP-sponsored Michigan seat belt use survey for commercial motor vehicle occupants during FY 2012 and 2015.

Direct Observation Surveys of Child Restraint Device Use and Misuse (including Booster Seat Use) – PI or co-PI on OHSP-sponsored child restraint device use/misuse survey, including booster seats in FY 2009, 2011, 2013, and 2015.

Direct Observation Surveys of Motorcycle Helmet Use – co-PI on OHSP-sponsored motorcycle helmet use survey in FY 2013.

Publications

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Dr. Peter T. Savolainen

Summary

Dr. Peter T. Savolainen is an Associate Professor in the Iowa State University Department of Civil, Construction, and Environmental Engineering. Prior to joining Iowa State University in 2014, he was an Associate Professor of Civil Engineering at Wayne State University. He has more than 7 years of experience with direct observation surveys of safety restraint use. This includes a diverse range of experiences in sample design and selection, data weighting, imputation, variance estimation, statistical systems development, and optimization techniques. He also has expertise in the areas of survey research methodology, data processing, and statistical quality control. Dr. Savolainen also teaches graduate level courses on civil engineering research methods and applications, as well as statistics and econometric methods of data analysis. He is a proficient user of various statistical analysis software packages, including LIMDEP, SAS, SPSS, and SUDAAN.

Education

Ph.D., Civil Engineering, Purdue University, 2006
M.A., Civil Engineering, Purdue University, 2004
B.S., Civil Engineering, Michigan Technological University, 2002

Professional Associations

American Society of Civil Engineers
American Statistical Association
Institute of Transportation Engineers

Computer Skills

Operation Systems: Windows, iOs
Software: LIMDEP, SAS, SPSS, SUDAAN, Microsoft PowerPoint, Excel and Word

Relevant Project Experience

Wayne State University (2006 to Present)

Direct Observation Surveys of Seat Belt Use –PI or co-PI on Michigan seat belt use survey, sponsored by funding through the Michigan Office of Highway Safety Planning (OHSP), from FY 2008 to 2010 and FY 2012 to present. Participated in proposal, planning, survey implementation, data collection, quality control, data analysis, and report preparation.

Direct Observation Surveys of Commercial Motor Vehicle Seat Belt Use – Co-PI on OHSP-sponsored Michigan seat belt use survey for commercial motor vehicle occupants during FY 2012.

Direct Observation Surveys of Child Restraint Device Use and Misuse (including Booster Seat Use) – PI or co-PI on OHSP-sponsored child restraint device use/misuse survey, including booster seats in FY 2009, 2011, 2013, and 2015.

Direct Observation Surveys of Motorcycle Helmet Use – co-PI on OHSP-sponsored motorcycle helmet use survey in FY 2013.

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APPENDIX III

List of Observation Locations by County, Stratum, and Road Classification Including Belt Use Observation Data

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
1	Ingham	I- 96 Bus and N Martin Luther King Jr Blvd	Original	Primary	218	216	40677.9
1	Ingham	E Saginaw St and Hagadorn Rd	Original	Primary	314	313	224659.6
1	Kalamazoo	W Kalamazoo Ave and N Rose St	Original	Primary	144	134	106467.4
1	Kalamazoo	E Michigan Ave and N Edwards St	Original	Primary	186	177	295041.6
1	Kalamazoo	I- 94 and Portage Rd	Original	Primary	123	121	65104.0
1	Washtenaw	I- 94 and Kalmbach Rd.	Original	Primary	41	34	31275.4
1	Oakland	I- 96 and 8 Mile Rd	Original	Primary	265	264	99966.1
1	Washtenaw	US Hwy 12 and S Huron St	Original	Primary	212	201	107896.6
1	Ingham	US Hwy 127 and N Cedar St	Original	Primary	232	218	43850.1
1	Washtenaw	US Hwy 12 and S Huron St	Original	Primary	209	189	164062.0
1	Washtenaw	I- 94 Bus and N Maple Rd	Original	Primary	180	172	267283.4
1	Oakland	I- 96 and Milford Rd	Original	Primary	115	108	31429.5
1	Oakland	I- 696 and Orchard Lake Rd	Original	Primary	248	221	199225.3
1	Oakland	I- 75 and Joslyn Rd	Original	Primary	285	259	73687.3
1	Kalamazoo	I- 94 and S Kalamazoo St	Original	Primary	211	187	84806.9
1	Ingham	State Hwy 99 and W Holmes Rd	Original	Secondary	196	193	67259.3
1	Ingham	Lansing Rd and W Mt Hope Hwy	Original	Secondary	194	187	67159.9
1	Ingham	E Saginaw St and N Larch St	Original	Secondary	387	385	104872.5
1	Kalamazoo	State Hwy 43 and Solon St	Original	Secondary	188	184	281669.4
1	Kalamazoo	US Hwy 131 and W Centre Ave	Original	Secondary	89	87	42704.3
1	Kalamazoo	State Hwy 43 and M 40	Original	Secondary	127	120	104327.1
1	Washtenaw	US Hwy 23 and Washtenaw Ave	Original	Secondary	273	270	63025.7
1	Washtenaw	W Michigan Ave and N Ann Arbor St	Original	Secondary	111	107	159316.7
1	Washtenaw	Ann Arbor Hill and E Main St	Original	Secondary	230	229	44647.5
1	Oakland	Woodward Ave and W Big Beaver Rd	Original	Secondary	268	245	320245.3
1	Oakland	State Hwy 10 and W 13 Mile Rd	Original	Secondary	196	183	141955.1
1	Oakland	Northwestern Hwy and Orchard Lake Rd	Original	Secondary	257	225	42820.3
1	Oakland	State Hwy 15 and E Seymour Lake Rd	Original	Secondary	166	151	117263.8
1	Oakland	State Hwy 5 and W 8 Mile Rd	Original	Secondary	174	164	227756.4
1	Oakland	Telegraph Rd and W Maple Rd	Original	Secondary	160	145	227756.4
1	Oakland	Dixie Hwy and Williams Lake Rd	Original	Secondary	346	314	68577.2
1	Oakland	S Main St and E University Dr	Original	Secondary	270	257	108359.9
1	Oakland	State Hwy 150 and E Avon Road	Original	Secondary	316	311	148041.7
1	Oakland	Lapeer Rd and Dutton Rd	Original	Secondary	216	202	140288.3
1	Ingham	State Hwy 43 and Marsh Rd	Original	Secondary	207	195	110456.0
1	Ingham	S Martin Luther King Jr Blvd and W Jolly Rd	Original	Secondary	194	174	92698.3
1	Ingham	Eaton Rapids Rd and Bishop Rd	Original	Secondary	207	193	104589.8
1	Ingham	State Hwy 52 and N Clinton St	Original	Secondary	236	216	43766.2
1	Washtenaw	W Michigan Ave and Platt Rd	Original	Secondary	229	212	189106.8
1	Washtenaw	State Hwy 52 and E Old US-12	Original	Secondary	104	95	133237.5
1	Kalamazoo	E Michigan Ave and 35th St N	Original	Secondary	81	75	37842.6
1	Kalamazoo	E C Ave and 32nd St N	Original	Secondary	287	282	95063.6
1	Oakland	State Hwy 59 and Hickory Ridge Rd	Original	Secondary	306	272	88719.7
1	Oakland	State Hwy 5 and W 13 Mile Rd	Original	Secondary	203	180	237369.5
1	Oakland	Woodward Ave and W 12 Mile Rd	Original	Secondary	223	205	225607.8
1	Ingham	N Waverly Rd and Columbia Hwy	Original	Local	64	62	1445836.5
1	Oakland	Heslip Dr and W 9 Mile Rd	Original	Local	49	41	1389137.0
1	Oakland	N Glenwood Ave. and N Perry Street	Original	Local	228	191	3968962.8
1	Oakland	White Pines Dr and Beck Road	Original	Local	40	38	1429994.0
1	Washtenaw	E Arkona Rd and Dexter St	Original	Local	58	52	1420006.7

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
2	Bay	I- 75 and E Pinconning Rd	Original	Primary	48	44	70092.2
2	Monroe	Detroit-Toledo Expy and Luna Pier Rd	Original	Primary	47	38	68613.6
2	Monroe	I- 75 and S Otter Creek Rd	Original	Primary	60	56	66504.9
2	Eaton	I- 96 and W Saginaw Hwy	Original	Primary	151	146	88382.7
2	Eaton	I- 69 and E Clinton Trail	Original	Primary	72	65	71445.3
2	Kent	I- 96 and E Beltline Ave NE	Original	Primary	236	226	174283.2
2	Kent	I- 96 and 28th St SE	Original	Primary	184	167	181860.7
2	Livingston	I- 96 and Fowlerville Rd	Original	Primary	104	96	67262.6
2	Ottawa	I- 196 and Adams St	Original	Primary	129	127	69165.1
2	Calhoun	I- 69 and M 60 E	Original	Primary	72	67	64633.8
2	Allegan	US Hwy 31 and M 89	Original	Primary	82	77	128876.3
2	Kent	I- 96 and Walker Ave NW	Original	Primary	328	320	135670.0
2	Calhoun	I- 194 and E Columbia Ave	Original	Primary	189	166	110602.8
2	Jackson	I- 94 and 28 Mile Rd	Original	Primary	75	65	69334.4
2	Bay	US Hwy 10 and W Midland Rd	Original	Primary	58	55	67617.9
2	Bay	Bay Glad Rd and W Neuman Rd	Original	Secondary	1	0	37955.7
2	Bay	State Hwy 13 and W Thomas St	Original	Secondary	243	233	348658.0
2	Monroe	W Monroe St and Riley St/Main St	Original	Secondary	284	265	367877.9
2	Monroe	US Hwy 23 and Tecumseh St	Original	Secondary	179	173	190040.1
2	Monroe	State Hwy 50 and Ridge Hwy	Original	Secondary	157	148	118927.7
2	Eaton	N Michigan Rd and Holt Hwy	Original	Secondary	103	91	146215.6
2	Eaton	State Hwy 50 and E Lawrence Ave	Original	Secondary	138	123	183281.4
2	Eaton	W Capital Ave and S Main St	Original	Secondary	213	193	115696.2
2	Kent	17 Mile Rd NE and Algoma Ave NE	Original	Secondary	134	124	97194.9
2	Ottawa	State Hwy 45 and W Olive Rd	Original	Secondary	74	69	90844.7
2	Ottawa	Chicago Dr and Balsam Dr	Original	Secondary	152	151	326088.6
2	Kent	Wilson Ave SW and Burton St SW	Original	Secondary	340	336	212667.6
2	Kent	State Hwy 11 and 3 Mile Rd NW	Original	Secondary	261	256	101334.5
2	Kent	State Hwy 6 and Broadmore Ave SE	Original	Secondary	361	355	162433.9
2	Eaton	W Grand Ledge Hwy and Charlotte St	Original	Secondary	159	159	87637.5
2	Livingston	Old US Hwy 23 and White Lake Rd	Original	Secondary	111	103	82812.4
2	Livingston	E State Hwy 36 and Chilson Rd	Original	Secondary	88	81	286206.2
2	Calhoun	W Dickman Rd and Hill Brady Rd N	Original	Secondary	211	205	194710.4
2	Allegan	Viaduct Rd and Cenrtal Ave	Original	Secondary	231	229	171145.5
2	Allegan	Lincoln Rd and Monroe Rd	Original	Secondary	269	257	238267.1
2	Allegan	US Hwy 131 and W Superior St	Original	Secondary	330	311	147741.4
2	Jackson	US Hwy 127 Bus and Washington St	Original	Secondary	226	205	209168.7
2	Jackson	State Hwy 50 and US-127	Original	Secondary	238	217	187821.8
2	Calhoun	M 66 and E Burr Oak Rd	Original	Secondary	174	150	120983.7
2	Jackson	S Meridian Rd and Jefferson Rd	Original	Secondary	266	242	273940.9
2	Jackson	N Main St and Chicago St	Original	Secondary	161	153	219107.7
2	Bay	State Hwy 138 and S Tuscola Rd	Original	Secondary	11	9	75911.3
2	Grand Traverse	State Hwy 72 and N Division St	Original	Secondary	218	206	490396.5
2	Grand Traverse	US Hwy 31 and M 72	Original	Secondary	132	123	357867.7
2	Midland	Isabella Rd and S Meridian Rd	Original	Secondary	113	100	353657.5
2	Kent	Whistlevale Dr and 76th St SW	Original	Local	8	6	2441051.4
2	Calhoun	E Dr N and 9 Mile Rd	Original	Local	18	16	2441051.4
2	Allegan	34th St and 128th Ave	Original	Local	11	11	4882102.8
2	Jackson	Springport Rd and Parma Rd	Original	Local	5	5	4882102.8
2	Midland	Foster Rd and E Wheeler St	Original	Local	35	28	2861922.3

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
3	St. Clair	I- 94 and Fred W Moore Highway	Original	Primary	100	97	94279.1
3	St. Clair	I- 94 and Gratiot Rd	Original	Primary	167	160	164432.5
3	St. Clair	I- 94 and Gratiot Rd	Original	Primary	125	118	90772.7
3	Berrien	I- 94 and Sawyer Rd	Original	Primary	135	118	90135.0
3	Berrien	US Hwy 31 and E Napier Ave	Original	Primary	271	250	193450.0
3	Berrien	I- 196 and Hagar Shore Rd	Original	Primary	78	68	87410.8
3	Van Buren	I- 196 and 32nd Ave	Original	Primary	27	24	82216.3
3	Shiawassee	I- 69 and State Hwy 71	Original	Primary	101	95	93670.5
3	Genesee	I- 69 and Grand River Rd	Original	Primary	31	30	83332.3
3	Saginaw	US Hwy 23 and Dixie Highway	Original	Primary	42	37	154760.0
3	Saginaw	US Hwy 23 and Dixie Highway	Original	Primary	199	197	92167.8
3	Genesee	I- 75 and W Pierson Rd	Original	Primary	235	217	342811.5
3	Clare	US Hwy 127 and Clare Rd	Original	Primary	76	70	99046.4
3	Clare	US Hwy 127 and E Colonville Rd	Original	Primary	195	172	119741.3
3	Branch	I- 69 and Chicago St	Original	Primary	114	103	182320.0
3	St. Clair	State Hwy 29 and Bethuy Rd	Original	Secondary	182	171	305375.3
3	St. Clair	Gratiot Blvd and Huron Blvd	Original	Secondary	312	289	753860.0
3	St. Clair	Beard Rd and North Rd	Original	Secondary	116	112	101238.5
3	Montcalm	N Greenville Rd and W Howard City Edmore Rd	Original	Secondary	116	113	308589.7
3	Newaygo	S Charles St and E Baseline Rd	Original	Secondary	367	354	219803.1
3	Newaygo	State Hwy 20 and N Evergreen Dr	Original	Secondary	100	94	154527.2
3	Newaygo	State Hwy 82 and Mason Dr	Original	Secondary	266	265	103827.6
3	Newaygo	Evergreen Dr and Curve St	Original	Secondary	225	220	213371.2
3	Muskegon	E Apple Ave and S Maple Island Rd	Original	Secondary	218	213	276968.3
3	Montcalm	State Hwy 46 and Holland Rd	Original	Secondary	202	198	192386.4
3	Montcalm	State Hwy 66 and W Stanton Rd	Original	Secondary	272	252	88888.6
3	Montcalm	Greenville Rd and E Vandeinse Rd	Original	Secondary	310	291	411847.1
3	Lapeer	N Branch Rd and N Van Dyke	Original	Secondary	12	11	76343.8
3	Sanilac	State Hwy 53 and W Marlette Rd	Original	Secondary	254	217	171325.6
3	Sanilac	State Hwy 46 and N Van Dyke Rd	Original	Secondary	133	109	166568.3
3	Sanilac	State Hwy 19 and Maple Valley St.	Original	Secondary	343	293	366794.7
3	Sanilac	S Elk St and E Sanilac Rd	Original	Secondary	236	230	126715.0
3	Sanilac	State Hwy 46 and S Lakeshore Rd	Original	Secondary	116	114	185880.6
3	St. Joseph	US Hwy 12 and M-62	Original	Secondary	182	154	237397.9
3	Lenawee	US Hwy 12 and M-52	Original	Secondary	140	130	225529.4
3	Lenawee	State Hwy 52 and W Monroe Rd	Original	Secondary	134	125	216307.5
3	Lenawee	State Hwy 156 and W Carleton Rd	Original	Secondary	73	65	188777.4
3	Shiawassee	S M 52 and W Lansing Rd	Original	Secondary	119	116	580515.4
3	Saginaw	State Hwy 52 and E 2nd St	Original	Secondary	143	140	159443.7
3	Saginaw	Oakley Rd and W Brady Rd	Original	Secondary	173	173	169194.4
3	Saginaw	N Main St and E Holland Rd	Original	Secondary	131	124	228378.9
3	Saginaw	Vassar Rd and E Washington Rd	Original	Secondary	107	99	233320.4
3	Saginaw	State Hwy 47 and W Freeland Rd	Alternate	Secondary	197	183	598344.7
3	St. Joseph	US Hwy 131 N and N Washington St	Original	Secondary	54	50	80258.9
3	St. Joseph	State Hwy 66 and S Centerville Rd	Original	Secondary	205	190	665718.1
3	Muskegon	Shoreline Dr and Terrace St	Original	Local	364	355	18890144.0
3	Lenawee	Rodesiler Hwy and Yankee Rd	Original	Local	11	11	4802719.8
3	Shiawassee	Lemon Rd and E Newburg Rd	Original	Local	0	0	N/A
3	Ionia	Button Rd and N Whites Bridge Rd	Original	Local	11	8	11238364.4
3	Saginaw	N Michigan Rd and Tittabawassee Rd	Original	Local	137	127	11192052.5

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
4	Wayne	Detroit Toledo Fwy and West Rd	Original	Primary	263	262	33172.1
4	Macomb	Ford Fwy and N River Rd	Original	Primary	167	159	48578.2
4	Macomb	I- 696 and Hoover Rd	Original	Primary	148	137	265423.7
4	Macomb	Walter P Reuther Fwy and Gratiot Ave	Original	Primary	126	114	137020.2
4	Macomb	Ford Fwy and Little Mack Ave	Original	Primary	128	115	70144.8
4	Wayne	Edsel Ford Fwy and Vernier Rd/ M-102	Original	Primary	282	255	85117.0
4	Wayne	Walter P Chrysler Fwy and Caniff St.	Original	Primary	171	147	64573.3
4	Wayne	I- 275 and S Huron Rd.	Original	Primary	106	96	47533.4
4	Wayne	I- 275 and Ford Rd	Original	Primary	290	265	125316.6
4	Wayne	I- 94 and Wayne Road	Original	Primary	147	126	31220.8
4	Wayne	Detroit Industrial Expy and Belleville Rd	Original	Primary	61	54	47169.0
4	Wayne	I- 94 and Middlebelt Rd	Original	Primary	62	50	123735.4
4	Wayne	I- 75 and Northline Rd	Original	Primary	204	201	64182.5
4	Wayne	I- 75 and Charter St	Original	Primary	68	68	25252.1
4	Wayne	Walter P Chrysler Fwy and Mack Ave	Original	Primary	238	224	30880.6
4	Wayne	US Hwy 24 and Van Horn Rd	Original	Secondary	334	322	108550.3
4	Wayne	Fort St and Van Horn Rd	Original	Secondary	307	299	98103.3
4	Wayne	State Hwy 85 and Sibley Rd	Original	Secondary	291	287	128227.1
4	Macomb	State Hwy 53 and 23 Mile Rd	Original	Secondary	252	233	74030.9
4	Macomb	State Hwy 53 Byp and Van Dyke Rd	Original	Secondary	40	39	32586.2
4	Macomb	State Hwy 53 Byp and 32 Mile Rd	Original	Secondary	212	187	126825.4
4	Macomb	State Hwy 53 and S Van Dyke Rd	Original	Secondary	250	229	82940.2
4	Macomb	State Hwy 59 and N Groesbeck Hwy/North Ave	Original	Secondary	150	148	281750.9
4	Macomb	20 Mile Rd and Romeo Plank Rd	Original	Secondary	170	150	348509.6
4	Macomb	Hall Rd and Schoenherr Rd	Original	Secondary	203	188	449681.5
4	Macomb	State Hwy 19 and 32 Mile Rd/Division Rd	Original	Secondary	190	181	141369.3
4	Macomb	Van Dyke Ave and 12 Mile Rd	Original	Secondary	125	114	185833.7
4	Macomb	Earl Memorial Hwy and E 14 Mile Rd	Original	Secondary	181	155	193856.6
4	Macomb	Van Dyke Ave and 15 Mile Rd	Original	Secondary	148	131	146713.1
4	Macomb	Metropolitan Pkwy Crossover - East Bound and Curwood Dr	Original	Secondary	203	179	112783.5
4	Macomb	Gratiot Ave and 14 Mile Rd	Original	Secondary	230	209	364245.0
4	Macomb	S Gratiot Ave and 15 Mile Rd	Original	Secondary	206	190	325765.8
4	Macomb	State Hwy 3 and 10 Mile Rd	Original	Secondary	387	339	283203.4
4	Wayne	Woodward Ave and 7 Mile Rd	Original	Secondary	209	185	261509.2
4	Wayne	State Hwy 10 and 7 Mile Rd	Original	Secondary	162	131	90366.1
4	Wayne	Grand River Ave and Fenkell St	Original	Secondary	115	96	84628.8
4	Wayne	Grand River Ave and Beech-Daly Rd	Original	Secondary	171	149	176254.1
4	Wayne	Michigan Ave and Oakwood Blvd	Original	Secondary	141	128	80813.8
4	Wayne	US Hwy 12 and Venoy Rd	Original	Secondary	180	161	115561.1
4	Wayne	State Hwy 153 and N Wayne Rd	Original	Secondary	324	288	86390.0
4	Wayne	Telegraph Rd and Wick Rd	Original	Secondary	103	93	319913.7
4	Wayne	S Telegraph Rd and Van Born Rd	Original	Secondary	62	58	260881.9
4	Wayne	Michigan Ave and Evergreen Rd	Original	Secondary	93	77	323773.3
4	Wayne	State Hwy 39 and Oakwood Blvd	Original	Secondary	436	432	56215.5
4	Wayne	State Hwy 3 and Grand Blvd W	Original	Secondary	219	215	64669.1
4	Macomb	Hiawatha Dr and Jewell Rd	Original	Local	71	65	1242672.0
4	Macomb	Beacon Square Dr and 21 Mile Rd	Original	Local	94	83	1533655.8
4	Macomb	Pinehurst and Martin Rd	Original	Local	31	27	1344055.5
4	Wayne	Pinewood Ave and Hoover St	Original	Local	10	8	1205015.3
4	Wayne	Prevost St and Grand River Ave	Original	Local	2	2	2410030.6