

2011 South Dakota Statewide Seatbelt And Motorcycle Helmet Use Survey

Final Report

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2011 SOUTH DAKOTA STATEWIDE SEATBELT AND MOTORCYCLE HELMET USE SURVEY

SUMMARY

A statewide observational survey of seatbelt and motorcycle helmet use on South Dakota roads was conducted in June of 2011. In early June, observers recorded seatbelt use, helmet use, and other demographic data for motorists and cyclists traveling along a probability-based sample of 205 observation sites on South Dakota rural and urban highways and interstates in 13 South Dakota counties. In late June, observers recorded supplemental helmet use data for motorcyclists traveling a sub-sample of the selected roads in the 13 counties. A total of 9,846 motorists (drivers, right front passengers of any age, and additional children under age 5 in the front or back seat) and 2,261 motorcycle drivers and passengers were observed.

Seatbelt Use Weighted Statewide Estimates

A statewide estimate of **73.4%** restraint use was observed for drivers and right front passengers, weighted for road type and vehicle miles traveled (VMT). This rate was lower than the weighted statewide estimate of 74.5% in 2010 (the highest rate ever achieved in South Dakota surveys). The difference between the 2010 and 2011 rates was statistically significant.

The slight dip in 2011 could be related to unusually reduced traffic on South Dakota roads (2,500 fewer motorists were observed in 2011 than in 2010) and a corresponding 3% decline in the proportion of out-of-state motorists who traditionally have high seatbelt use. Alternatively, the decrease could indicate that seatbelt use rates in South Dakota have reached a temporary plateau and are fluctuating around the 74% rate.

The 2011 rate of 73.4% is the second highest seatbelt rate to be observed on South Dakota since the surveys began in 1998. This rate is within 8 points of the nation-wide seatbelt rate of 81% reported by NHTSA for the Midwest in 2010 (Pickerell & Ye, 2010a).

The 2011 weighted statewide estimates for seatbelt use by road type were **67%** for urban highways (7 points lower than the 74% rate in 2010), **67%** for rural highways (4 points lower than the 71% rate in 2010), **74%** for urban interstates (2 points lower than the 76% rate in 2010), and **86%** for rural interstates (7 points higher than the 79% rate in 2010). The changes between 2010 and 2011 for all road types were statistically significant.

Seatbelt Use Unweighted Results

All Occupants

Results showed that for unweighted observations, 70% of all observed motorists

were wearing a seatbelt or child restraint. This unweighted percentage is lower than the 74% rate observed in the 2010 survey. Note that these rates are unweighted for road type and VMT and are not as representative as the weighted statewide estimate of 73.4%.for 2011 and 74.5% for 2010.

County

The unweighted 2011 seatbelt use rates for counties by descending population size were Minnehaha (78%), Pennington (68%), Brown (76%), Lawrence (63%), Davison (63%), Beadle (65%), Hughes (53%), Union (97%), Charles Mix (49%), Grant (73%), Fall River (65%), Tripp (68%), and Kingsbury (72%).

The counties from highest to lowest unweighted seatbelt use rates were Union (97%), Minnehaha (78%), Brown (76%), Grant (73%), Kingsbury (72%), Pennington (68%), Tripp (68%), Beadle (65%), Fall River (65%), Lawrence (63%), Davison (63%), Hughes (53%), and Charles Mix (49%).

Compared to rates in 2010, unweighted seatbelt use rates stayed the same for Minnehaha and Beadle counties, increased for the four counties of Pennington (+3), Union (+8), Fall River (+3), and Kingsbury (+4), and decreased for the seven counties of Brown (-7), Lawrence (-10), Davison (-9), Hughes (-21), Charles Mix (-27), Grant (-4), and Tripp (-6).

Age Group

An important finding of the 2011 survey is that children judged to be younger than age 5 years had an unweighted restraint use rate of 91%, up from the 82% rate in 2010. The 91% rate for children younger than five is an historic high in the 12 years of the survey. However, seatbelt use for children judged to be age 5 to 13 had an unweighted seatbelt use of 68%, down moderately from the 2010 rate of 74%.

Another important finding is that unweighted seatbelt rates for youth appearing to be age 14 through 17 increased from 69% in 2010 to 72% in 2011. This rate is an historic high for a group whose seatbelt use was in the 40% range from 2000 to 2006. Occupants who appeared to be adults over age eighteen had a rate of 69%, nearly the same as the 70% rate for adults in 2010.

Driver/Passenger, Vehicle Type, In-Out of State License

The unweighted seatbelt use rates were slightly higher for front seat passengers (70%) than for drivers (69%). Higher use by passengers than drivers has been found in all previous surveys since 2000. For vehicle type, unweighted seatbelt use rates were highest for occupants of vans and station wagons (80%), followed by those in cars (72%) and SUVs (73%). As found in previous surveys, seatbelt use was lowest for occupants of pickup trucks (58%). Another consistent finding is that occupants of vehicles with out-of-state license plates had a higher seatbelt use rate (81%) than occupants of vehicles with SD license plates (67%).

Motorcycle Helmet Use Weighted Statewide Estimates

A total of 2,261 motorcyclists were observed in 2011. The statewide estimate of helmet use by motorcyclists on South Dakota roads weighted for road type and VMT was **50.80%**. The 2011 helmet use rate of 50.8% was 2.4 points lower than the 53.4% rate observed in 2010 – a statistically significant difference. The 50.8% statewide helmet use rate is 8 points higher than the 43% helmet use rate reported by NHTSA for the Midwest in 2010 (Pickrell & Ye, 2010b).

The 2011 weighted statewide estimates for helmet use by road type were: **41.5%** for urban highways (6 points higher than the 35% rate in 2010); **45.6%** for rural highways (14 points lower than the rate of 59% in 2010); **37.8%** for urban interstates (5 points higher than the 33% rate in 2010); and **65.9%** for rural interstates (6 points higher than the 59% rate in 2010). All differences in rates between 2010 and 2011 were statistically significant.

Note that due to the scarcity of motorcycle traffic on many South Dakota roadways, most counties had one or more sites with zero motorcycle observations. Consequently, the statewide estimates for helmet use are less reliable than the statewide estimates for seatbelt use.

Motorcycle Helmet Use Unweighted Results

All Riders

The unweighted helmet use rate for all observed motorcyclists was 42%. This compares to the unweighted helmet use rate of 45% in 2010. Note that these rates are unweighted for road type and VMT and are not as representative as the weighted statewide helmet use estimates (50.8% for 2011 and 53.4% for 2010).

County

The unweighted helmet use rates for counties by descending population size were Minnehaha (33%), Pennington (49%), Brown (59%), Lawrence (42%), Davison (32%), Beadle (41%), Hughes (40%), Union (51%), Charles Mix (19%), Grant (39%), Fall River (60%), Tripp (64%), and Kingsbury (29%).

Unweighted helmet use rates from highest to lowest for counties were Tripp (64%), Fall River (60%), Brown (59%), Union (51%), Pennington (49%), Lawrence (42%), Beadle (41%), Hughes (40%), Grant (39%), Minnehaha (33%), Davison (32%), Kingsbury (29%), and Charles Mix (19%).

One difference was that the helmet use rate in the heavily populated Minnehaha County was relatively low (33%), while helmet use rates in the populated counties near the Black Hills were somewhat higher (Pennington, 49%; and Lawrence, 42%).

Compared to 2010 rates, unweighted helmet use rates in 2011 were the same or within 2 percentage points for 5 counties -- Brown, Beadle, Union, Charles Mix, and Fall River). Rates were higher for four counties -- Minnehaha (+ 8), Pennington (+5), Hughes (+11), and Tripp (+19), and lower in four counties – Lawrence (-21), Davison (-7), Grant (-3), and Kingsbury (-12).

Overall, helmet use rates in the more populated counties were stable or fluctuated moderately between 2010 and 2011. However, the 21-point drop in the Lawrence County rate from last year indicates that helmet use declined in the rural Black Hills area.

Age Group

Over 95% of motorcycle riders in the survey appeared to be of adult age – 18 years and over. Of these adult riders, 42% were wearing helmets. Of riders judged to be between 14 to 17 years of age, 50% were wearing helmets. Thus, only half of the teen motorcyclists observed in the survey were in compliance with South Dakota's law mandating helmet use for riders age 17 and under.

The single child observed in the survey who appeared to be age 5 to 13 was wearing a helmet. There were no observations of riders who appeared to be under age five.

Driver/Passenger, In/Out of State License

Unweighted helmet use was higher for passengers (51%) than for drivers (40%). A similar difference was found in 2010 (55% for passengers and 42% for drivers.) Unweighted helmet use for riders with out-of state license plates was 60% compared to 35% for riders with South Dakota license plates. A similar difference was found in 2010 (67% for out-of-state and 37% for in-state riders).

Introduction

This report is about a probability-based study of seatbelt and helmet use rates of motorists observed on South Dakota roads in June, 2011. The research, commissioned by the South Dakota Office of Highway Safety (OHS), is the 12th consecutive survey that has been conducted annually since June of 2000. This project represents a partnership between the OHS and the National Highway Traffic Safety Administration (NHTSA) created to increase the safety of travel and to save lives in South Dakota.

Seatbelt and Child Restraint Use

Motor-vehicle accidents are the leading cause of death among U. S. residents aged 5 – 34 years and account for about 15% of all nonfatal injuries treated in emergency departments. It has been estimated that the life-time costs for the lost productivity and medical care of victims of fatal and nonfatal motor-vehicle accidents is approximately \$70 billion (Beck & West, 2010). The use of seatbelts has been shown to be the most effective way to preventing these deaths and injuries (Thomas, Cook, & Olson, 2011.) Based on evidence from NHTSA, wearing seatbelts can reduce the risk of serious injury to the head, chest, and extremities by 50% to 83% (Strine et al., 2010).

The purpose of the present study was to document seatbelt use rates in South Dakota for the year of 2011 and to interpret trends in how seatbelt use has varied by region and age of motorist over the past decade. In 2010, the seatbelt use rate in South Dakota was estimated to be 73.4% (Struckman-Johnson et al., 2010). This rate was 11 points below the national rate of 85% for 2010, but was only 8 points below the 81% rate for the Midwest region (Pickrell & Ye, 2010a). Factors thought to be lowering seatbelt rates in states like South Dakota are cultural beliefs in rural areas that are not supportive of the benefits of seatbelt use and the popular use of pickup trucks, whose occupants tend to have low seatbelt use (Strine et al., 2010).

Factors thought to be increasing seatbelt use in states like South Dakota are mandatory laws. Since 1984, the state has required that all children under age five or weighing less than 40 pounds must be in a safety seat when riding in motor vehicles. In 1995, the state implemented a secondary enforcement law requiring seatbelt use for front seat drivers and passengers. “Secondary” enforcement means that the law can only be enforced if the vehicle occupant is stopped for another offense. In 2001, the state mandated primary enforcement of seatbelt use for all motor vehicle passengers under the age of 18. In 2008, the penalty for a seatbelt violation increased from \$20 to \$25. Another factor promoting seatbelt use in South Dakota is the active efforts of the Office of Highway Safety through law enforcement and educational efforts to persuade citizens to buckle up.

Motorcycle Helmet Use

A second purpose of the present study was to document the level of helmet use by motorcyclists traveling South Dakota highways and to estimate changes that have occurred since 2010. Motorcyclists are 35 times more likely than car occupants to die in a motor vehicle crash and 8 times more likely to be injured per vehicle mile (Weiss, et al., 2010). According to NHTSA, in 2008, 5,290 motorcyclists died and 96,000 were injured. Motorcycle crashes accounted for 10% of all motor vehicle crash fatalities, with head injuries being the most common injury and the cause of death in more than 50% of fatalities (MacLeod et al., 2010).

As with seatbelt use, there is overwhelming evidence that wearing a motorcycle helmet offers substantial protection from death and injury. A meta-analysis of 45 studies by MacLeod et al. (2010) found that non-helmeted riders sustained a head injury at more than twice the rate of helmeted riders. Studies of states that have repealed helmet laws have found a corresponding increase in motorcyclist fatalities (Bavon & Standerfer, 2010.) Contrary to a common belief that helmets lead to neck injuries in collisions, helmet use is actually associated with a lower risk of cervical spine injury (Crompton et al., 2010).

In 2010, the helmet use rate in South Dakota was estimated to be 53.4%. This rate was about 1% lower than the 2010 nation-wide rate of 54% reported by NHTSA. However, the South Dakota rate was 10 points higher than the 43% reported by NHTSA for the Midwest in 2010. Factors thought to be decreasing helmet use rates in South Dakota are those associated with being a rural state, including cultural differences and beliefs about the protective value of helmets. Within the state, the rural “west river” culture that stresses independence and freedom of action may work against the use of protective helmet gear for rides through the plains and mountains.

Factors thought to increase helmet use in states like South Dakota are mandatory helmet use laws. The most effective strategy to increase helmet use is passage of laws that mandate that motorcyclists wear helmet protection (MacLeod et al., 2010). In 2010, 20 states and the District of Columbia had a “universal” helmet law that requires that all motorcyclists be helmeted (Pickrell & Ye, 2010b). In 2010, 26 states had “partial”, or “age specific” or “youth specific” laws that mandate helmet use for younger riders (MacLeod, et al., 2010). In 1977, South Dakota’s universal helmet law was repealed in 1977 (Struckman-Johnson & Ellingstad, 1980). In its place a new “youth specific” law was passed that mandated helmet use for riders age seventeen and younger—a law that remains in effect today.

The Present Study -- Overview

The present study involved two separate traffic survey periods in June of 2011. In early June, observers in 13 counties recorded safety restraint use and helmet use of passing motorists and cyclists over a four day period. This is referred to as the “official” survey period that was designed to obtain data on seatbelt use of 10,000 to 12,000

twelve thousand motorists and at least 500 motorcyclists. At the end of June during optimal motorcycle riding weather, a second survey of helmet use by passing motorcyclists was conducted for four days on a sub-sample of road sites in the 13 counties. This survey period, referred to as the “supplemental motorcycle-only” survey, was designed to increase the motorcyclist sample size up to 2,000 for more reliable and representative results. The methods and results of these two survey periods are described in the remainder of this report.

Methods

The methods used in this study were designed according to federal guidelines established by NHTSA and were originally implemented in the 1998 South Dakota Statewide Seatbelt Survey. The methods and procedures described below are in compliance with the “Uniform Criteria for State Observational Surveys of Seat Belt Use”, published in the Federal Register on September 1, 1998 (63 F.R. 463389). The design was modified in the 2000 survey in an effort to increase the observations for children under the age of five years. In 2007, a separate vehicle type code was added for pickup trucks. In 2009, the design was expanded to include collection of motorcycle helmet use data. A supplemental helmet use data collection period in late June was added for the two largest counties. In 2010 and 2011, the supplemental observation period for motorcycles in late June was expanded to all thirteen counties.

Survey Design: Stage 1

This study used the geographic sampling techniques and road segment sites established in the 1998 survey. The first step was to select geographic areas for sampling of traffic. South Dakota is a state with less than 800,000 citizens residing in 66 counties. The population is not evenly distributed throughout the state, as 50% of the citizens live in eight counties with urban centers. Many of the remaining 58 counties have low populations residing in largely rural areas.

Because it is difficult to sample traffic in all areas of a state with a low population, a “multi-stage cluster approach” was utilized. In this plan recommended by NHTSA guidelines, sampling can be restricted to the counties that account for 85% of the state’s population. Therefore, the sampling pool was comprised of the 33 largest counties in South Dakota that account for 85% of South Dakota’s population. Table 1 shows the eligible counties in ascending order according to population size.

**Table 1: Largest South Dakota Counties Accounting
for 85% of the State Population**

County	Population	% of State	Cumulative %
1-33			14.44%
34 Dewey	5668	0.77%	15.21%
35 McCook	5686	0.77%	15.98%
36 Kingsbury	5830	0.79%	16.77%
37 Day	6421	0.87%	17.64%
38 Moody	6538	0.89%	18.53%
39 Tripp	6883	0.93%	19.46%
40 Custer	6966	0.94%	20.40%
41 Fall River	7123	0.97%	21.37%
42 Bon Homme	7677	1.04%	22.41%
43 Spink	7700	1.04%	23.45%
44 Grant	8048	1.09%	24.54%
45 Hutchinson	8102	1.10%	25.64%
46 Turner	8633	1.17%	26.81%
47 Butte	8926	1.21%	28.02%
48 Todd	9296	1.26%	29.28%
49 Charles Mix	9493	1.29%	30.57%
50 Roberts	9973	1.35%	31.92%
51 Lake	10,647	1.44%	33.36%
52 Union	11,959	1.62%	34.98%
53 Shannon	12,010	1.63%	36.61%
54 Clay	15,370	2.08%	38.69%
55 Hughes	15,404	2.09%	40.78%
56 Beadle	17,976	2.44%	43.22%
57 Davison	18,807	2.55%	45.77%
58 Lincoln	20,152	2.73%	48.50%
59 Yankton	21,013	2.85%	51.35%
60 Meade	21,999	2.98%	54.33%
61 Lawrence	22,131	3.00%	57.33%
62 Codington	25,452	3.45%	60.78%
63 Brookings	26,186	3.55%	64.33%
64 Brown	35,701	4.84%	69.17%
65 Pennington	87,190	11.81%	80.98%
66 Minnehaha	140,518	19.04%	100.00%
TOTAL	737,973		

Table 2: Selected South Dakota Counties and Their Populations

	County	Population
1.	Minnehaha	140,518
2.	Pennington	87,190
3.	Brown	35,701
4.	Lawrence	22,131
5.	Davison	18,807
6.	Beadle	17,976
7.	Hughes	15,404
8.	Union	11,959
9.	Charles Mix	9,493
10.	Grant	8,048
11.	Fall River	7,123
12.	Tripp	6,883
13.	Kingsbury	5,830

According to NHTSA guidelines, a sample of 13 counties could be drawn for a state with at least 85% of the population residing in 30 – 39 counties. The two largest counties in the state were selected and the remaining 11 counties were randomly drawn. Although Hutchinson County was initially drawn for the sample, it was learned that the county would be undergoing a local seatbelt survey in the fall of 1998. Therefore, Tripp County was substituted. Table 2 lists the counties that were selected and their corresponding populations.

Survey Design: Stage 2

The second stage of the study was to select the sample of road segments to be surveyed within the 13 counties. According to NHTSA guidelines, road segments must be drawn from roads that have an adequate level of traffic based upon Vehicle Miles Traveled (VMT) estimates. Initially, it was estimated that there were an average number of 50 road segments available for sampling in the South Dakota counties. According to the NHTSA guidelines, 19 road segments can be sampled from a base of 50 road segments per county.

However, assessment of 1998 VMT estimates for South Dakota roadways revealed that only an average number of 27 road segments were available for sampling in the 13 counties. (Relative to other states, South Dakota has a limited number of roadways for which VMT estimates are recorded.) Therefore, permission was received from the NHTSA regional survey design advisor to sample 17 or fewer road segments per county.

In order to select the road segments, maps of roadways and VMT estimates per roadway segments for the 13 counties were obtained from the South Dakota Department of Transportation, Division of Planning and Engineering. Roadways were divided into four classifications:

Urban Interstate

Urban Highway -- principal and minor highways within designated urban areas (5,000 + population)

Rural Interstate

Rural Highway -- principal and minor highways outside of urban areas.

Following recommendations from the NHTSA regional survey design advisor, road segments for urban interstate and urban highways were measured in one mile units, whereas road segments for rural interstate and rural highways were measured in ten mile units. VMT estimates were calculated for each road segment chosen. Road segments with unacceptably low VMT estimates were excluded. Once all of the roadways in a county were divided into eligible segments, a random numbers program was used to select 17 segments for sampling.

The random selection procedure was restricted by the roadway classification of a segment so that the number of segments chosen would be proportionate to the total VMT traveled on a roadway type for that county. For example, in Minnehaha County, the proportions of total vehicle miles traveled by roadway type were:

23% for Urban Interstate

43% for Urban Highways

25% for Rural Interstate

10% for Rural Highways.

Therefore, the drawing of selected road segments was restricted to:

4 Urban Interstate sites (about 23% of 17 sites)

7 Urban Highway sites (about 43% of 17 sites)

4 Rural Interstate sites (about 25% of 17 sites)

2 Rural Highway sites (about 10% of 17 sites).

The procedure described above was applied individually to the 13 counties for final selection of the 17 road segments. Five counties (Brown, Davison, Grant, Kingsbury, and Tripp) had only 13 to 16 road segments chosen because of a limited number of roadways with VMT data available.

The last step in the road segment selection process was to designate a seatbelt observation site within each of the 205 selected road segments. Whenever possible, the observation site was placed at an intersection in which vehicles slowed or stopped for a traffic signal or sign. This allowed for accurate and safe viewing of seatbelt and helmet use by the Observers. See Appendix A for a list of the observation sites by mile marker and probability of selection in counties by the four roadway types.

Sampling Time Periods

Six 90-minute blocks of daylight time were scheduled for seatbelt observations. The actual observation time per period was 40 minutes. Including travel time, six sites could be observed in a single day. A county could therefore be surveyed in a four-day period. To minimize travel time and distance required to conduct the survey, some sample sites were grouped into geographic clusters. A day of the week to begin data collection was assigned to a cluster. Within a cluster, each road segment was randomly assigned to the available time slots. The time blocks were:

- 1) 7:30 A.M. - 9:00 A.M.
- 2) 9:00 A.M. - 10:30 A.M.
- 3) 10:30 A.M. - 12 noon
- 4) 12 noon - 1:30P.M.
- 5) 1:30P.M. - 3:00 P.M.
- 6) 3:00P.M. - 4:30P.M.

Sample time periods were scheduled for two week days and for Saturday and Sunday.

Sample Size

Based on previous observational surveys in South Dakota, it was estimated that approximately 10,000 vehicle observations would be collected from the 205 sites. This sample size allows one to be 95% confident that the numbers reported would be within 1% of the actual values -- an acceptable margin of error according to NHTSA guidelines.

Data Collection

The original 1998 data collection form was designed for recording seatbelt use (yes or no) by front seat drivers and right-side passengers of each vehicle observed in the survey. For the 2000 survey, the data collection form was modified to measure seatbelt and child restraint use of all child passengers between 0-4 years of age, front or back seat. This change was implemented in all subsequent surveys.

The form allowed collection of other information of interest to the SD Office of Highway Safety, including estimated age of drivers and passengers, in- or out-of-state vehicle license plate, and type of vehicle such as car, van, or SUV. In 2007, the form was modified to provide a separate category for pickup trucks. Demographic data were also collected for each vehicle observation period including county, site number, time of day, date, observer initials, and roadway type.

In 2009, the form was modified to include motorcycles as a vehicle type. Observers were instructed to record all information about motorcycle drivers and passengers in the same manner as for four-wheeled vehicles except that helmet use – yes or no—was recorded in the same column used for seatbelt use. A copy of the 2009 modified form used for the 2011 survey is on the last page of the Observer Manual in Appendix B.

Observer Selection and Training

One Observer was assigned to a county. In the 1998 through 2004 surveys, Observers were primarily members of a retired senior citizens group with a background in driver education. Since the 2005 survey, Emergency Medical Technicians (EMT's) were contracted by the SD Office of Highway Safety to be Observers. All of the 2011 EMT Observers had participated in the 2005 through 2010 surveys and were expert observers. In most survey years, some Observers had another person (usually a family member) assist them in the data collection process.

Observers received: 1) a descriptive list and maps of the site locations in their respective counties; 2) a four-day schedule during the first week of June for completing one observation period at each site in their county; 3) an instruction manual explaining how to conduct roadside observations, including the procedures for observing motorcycles; and 4) coding sheets for recording data. Observers were instructed to read the manual and engage in a practice period with local traffic. Investigator Cindy Struckman-Johnson arranged individual training calls to Observers in the week before the survey period to review procedures. A copy of the 2011 Observer instruction letter for the survey is in Appendix C.

Site Selection

Observers were instructed to follow their observation schedules as closely as possible. If Observers could not complete a scheduled site due to weather or other problems, they were instructed to use alternative times presented on their observation schedule. Upon arrival at a site, Observers were asked to find a safe viewing place. They were to station themselves so that they could view traffic traveling in a pre-designated direction on the pre-designated roadway.

Sampling Procedures

Observers were instructed to observe *every* four-wheeled vehicle if the traffic flow was regular or light and *every other* vehicle if the traffic flow was heavy. Because motorcycles were expected to appear infrequently, Observers were told to select *every* motorcycle that appeared in their stream of traffic during the survey period. They were instructed also to survey passing motorcycles that were not in their stream of traffic if helmet use of the riders could be clearly determined. This over-sampling was done to increase the number of motorcycles for more reliable data analyses.

Observers monitored traffic for 40 minutes of the 90-minute observation period, and used the remaining minutes to travel to the next observation point. The data collection procedures are explained in the "Observer Manual – 2011 South Dakota Seatbelt Survey" in Appendix B.

Supplemental Motorcycle-Only Observation Survey

In 2009 when motorcycles were added to the survey, only 530 motorcyclists were recorded in the early June observation period. We learned that motorcycle traffic in South Dakota is light during this cool and often rainy time of year. To increase our cycle sample size, we arranged a supplemental survey of four sites each in Minnehaha and Pennington counties during the last Friday through Sunday in June. These eight extra hours in the state's most populated counties raised the number of cyclists to 1,034.

To further increase the cyclists sample size in 2010, the supplemental survey in late June was expanded to all 13 counties. Observers were instructed to record motorcycle helmet use for 40 minutes at eight different sites over a four-day period (Friday through Monday) when the weather was favorable. This yielded a sample size of 2,144 for 105 sites.

In 2011, the procedures for the supplemental motorcycle survey in late June were repeated. Observers in thirteen counties were instructed to observe the same 105 sites selected the previous year over a four-day period (Friday through Monday) in the last weekend of June. Materials and schedules were mailed to Observers one week before the start date. Investigator Cindy Struckman-Johnson followed up with phone calls or e-mails to review procedures.

Review of Data

Data were screened using methods similar to previous years. Two graduate students in the Human Factors program at USD reviewed over 12,000 lines of raw data for unreadable writing, obvious errors, and logical inconsistencies in the coding (e.g., two drivers in a vehicle with the same ID number; a driver with an infant age). When possible, the coding was corrected. If questions remained about the validity of the coding, the observation was discarded. Data were encoded into EXCEL spreadsheets and checked for accuracy by Investigator Dave Struckman-Johnson. Investigator Carryl Baldwin then used additional computer analyses to detect logical errors in coding before conducting final data analyses. Analyses of data for automobiles were conducted separately from motorcycle data.

Results

Seatbelt and Child Restraint Use

A total of 9,846 automobile drivers and passengers from the 13 selected counties were included in the analyses for this 2011 survey. Motorcycle observations were excluded from this data set. The automobile sample size in tables of results varies by a small number of observations in some analyses due to missing data. When reporting results in the text, percentages for weighted statewide estimates are rounded to one decimal point for accuracy. Percentages for unweighted data are rounded to the nearest total percentage for clarity.

Weighted Estimate of Statewide Seatbelt Use

NHTSA guidelines require that a statewide seatbelt use be estimated by adjusting seatbelt use rates observed at every individual county site for road type and VMT. Essentially, the adjusting process gives more weight to seatbelt use rates observed on roads that are more heavily traveled. The statewide estimate of seatbelt use was obtained by finding the percentage of seatbelt use for each of the 205 sites, and then computing a weighted mean for each road type for each county. Then, a weighted average for each road type across counties was found where the weights were the VMT for that county on that road type and the sampling weight for the county based on the probability of its selection to be included in the survey. Finally, the estimates for the four road type averages were weighted by the VMT for each road type for the entire state.

The resulting estimate for seatbelt use on all South Dakota roads was 73.4% with a standard error of 0.2549. Thus, it can be said that there is a 95% probability that the true rate of seatbelt use for South Dakota roads ranges between 72.4% and 74.3%. The formulas and weights for calculating the statewide estimate and standard deviation are in Appendix D.

The 2011 statewide estimate of 73.4% was approximately 1 percentage point lower than the 2010 rate of 74.5%. This difference is statistically significant, $t_{(60)} = -16.08$; $p < .001$. As shown in Table 3 and Figure 1, the statewide average restraint use rate steadily increased from 2000 to 2007, dipped one point in 2008, increased again in 2009, reached a historical high in 2010, and then dipped one point in 2011. Despite the drop, the 2011 seatbelt use rate of 73.4% is higher than all statewide seatbelt rate estimates from 2000 to 2009. The South Dakota statewide rate is within 8 points of the 81% percent rate observed for NHTSA for Midwestern states in 2010 (Pickrell & Ye, 2010a).

Weighted Estimate of Statewide Seatbelt Use by Road Type

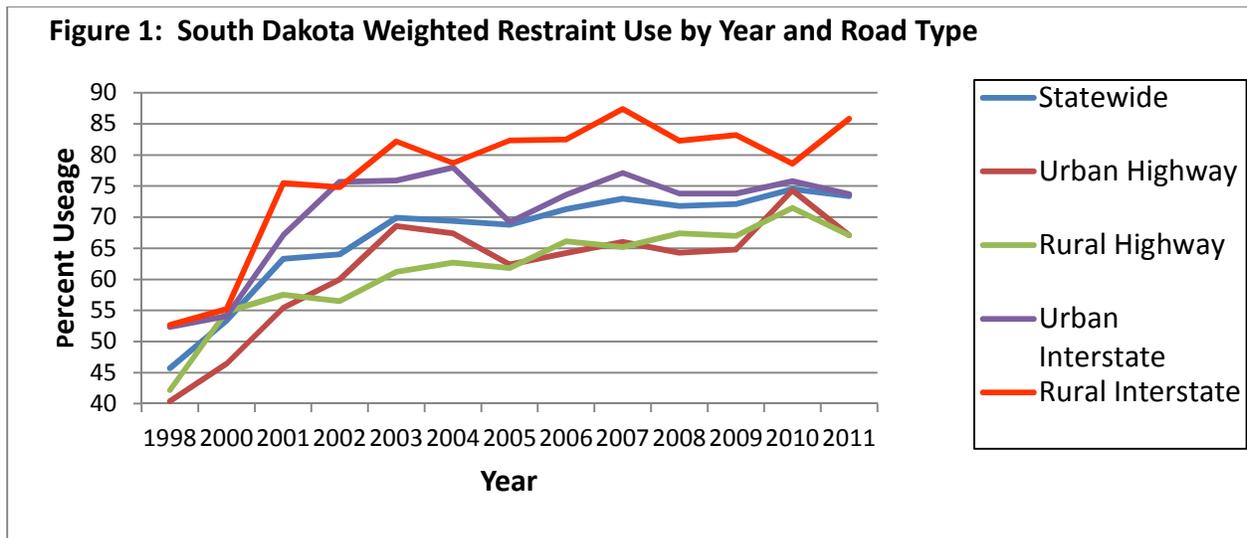
The 2011 weighted statewide estimates for seatbelt use by road type were 67.1% for urban highways, 67.1% for rural highways, 73.7% for urban interstates, and 85.8% for rural interstates. Compared to 2010 rates (see Table 3), seatbelt use decreased on urban highways by 7.2%, $t_{(14)} = -52.35$; $p < .001$; decreased 4.4% on rural highways, $t_{(26)} = -31.22$; $p < .001$, decreased 2.1% on urban interstates, $t_{(10)} = -26.96$; $p < .001$; and increased 7.2% on rural interstates, $t_{(10)} = 23.98$; $p < .001$.

As can be seen in Table 3 and Figure 1, statewide estimated rates for urban highways rose almost 30 percentage points from 46% in 2000 to a historical high of 74% in 2010 before dropping back into the high 60% range this year. Statewide rates for rural highways rose about 15% from 55% in 2000 to an historical high of 72% in 2010, before dropping back into the high 60% range this year. Urban interstate rates rose over 20% points from 54% in 2000 to a historical high of 76% in 2010, before dropping a few points this year. Rates for rural interstate highways increased over 25 percentage points from 55% in 2000 to 82% by 2003, then to an historical high of 87%

in 2007. Rates decreased over the next several surveys to 79% in 2010. The 2011 rate of 86% represents a substantial upturn and is the second highest rate observed in the 12 years of the survey.

Table 3: South Dakota Weighted Percent Restraint Use by Year and Road Type

Road Type	Year											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Urban Highway	46.4	55.4	60.0	68.6	67.4	62.4	64.2	66.0	64.3	64.8	74.3	67.1
Rural Highway	54.8	57.5	56.5	61.2	62.7	61.8	66.1	65.2	67.4	67.0	71.5	67.1
Urban Interstate	54.1	75.7	75.7	75.9	78.0	69.6	73.6	77.1	73.8	73.8	75.8	73.7
Rural Interstate	55.2	74.8	74.8	82.2	78.7	82.4	82.5	87.4	82.3	83.2	78.6	85.8
Statewide Average	53.4	63.3	64.0	69.9	69.4	68.8	71.3	73.0	71.8	72.1	74.5	73.4



Unweighted Seatbelt Use for All Motorists

The unweighted restraint use for all motorists was 69%, a rate that was moderately lower than the unweighted rate of 74% observed in 2010. Note that these rates are unweighted for road type and VMT and are not as representative as the weighted statewide seatbelt use estimates (73.4% for 2011 and 74.5% for 2010).

Unweighted Seatbelt Use by County

The unweighted seatbelt use rates for the 13 South Dakota counties by descending population size are in Table 4. The counties with the highest rates in 2011 were Union with 97%, Minnehaha with 78%, Brown with 76%, Grant with 73%, Kingsbury with 72% and Tripp and Pennington each with 68%. Counties with midlevel rates were Beadle and Fall River each with 65%, and Lawrence and Davison each with 63%. In the lowest tier were Hughes with 53% and Charles Mix with 49%.

Comparing 2011 rates with 2010, two counties - Minnehaha and Beadle - had nearly the same rate (within 1 to 1½ percentage points). Four counties showed an increase from 2010: Pennington by 3%, Union by 8%, Fall River by 3% and Kingsbury by 4%. Seven counties showed a decrease from 2010 rates: Brown by 7%, Lawrence by 10% Davison by 9%, Hughes by 21%, Grant by 4%, Tripp by 6%, and Charles Mix with the largest decrease (27%).

A summary of seatbelt use rates for the 13 counties over ten survey periods is in Table 5 and Figures 2A and 2B. Overall, the counties show rising but fluctuating seatbelt use rates over the past eleven years.

Table 4: South Dakota 2011 Unweighted Restraint Use by County

County	Restraint Used		Totals
	Yes	No	
Minnehaha	1091 77.5%	316 22.5%	1407
Pennnington	642 68.2%	299 31.8%	941
Brown	396 76.0%	125 24.0%	521
Lawrence	682 63.4%	394 36.6%	1076
Davison	481 62.8%	285 37.2%	766
Beadle	508 65.2%	271 34.8%	779
Hughes	312 52.7%	280 47.3%	592
Union	673 97.4%	18 2.6%	691
Charles Mix	291 49.3%	299 50.7%	590
Grant	729 72.7%	274 27.3%	1003
Fall River	233 64.9%	126 35.1%	359
Tripp	94 68.1%	44 31.9%	138
Kingsbury	710 72.2%	273 27.8%	983
Total	6842 69.5%	3004 30.5%	9846

Table 5: South Dakota Unweighted Percent Restraint Use by County by Year

County	Year										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Minnehaha	69	69	80	82	73	73	77	80	80	78	78
Pennington	51	63	67	70	70	77	72	70	69	65	68
Brown	64	56	65	62	58	61	62	59	70	83	76
Lawrence	62	54	73	68	69	65	65	63	60	73	63
Davison	67	76	60	70	69	76	76	65	62	72	63
Beadle	57	63	55	63	68	67	65	77	63	65	65
Hughes	54	62	76	77	55	54	53	58	50	74	53
Union	71	71	77	79	76	87	98	97	97	89	97
Charles Mix	28	41	48	50	48	59	36	48	53	76	49
Grant	53	66	45	53	55	78	77	83	66	77	73
Fall River	58	62	60	63	60	72	69	64	74	62	65
Tripp	39	47	37	33	50	66	56	66	59	74	68
Kingsbury	44	46	49	43	55	57	70	76	68	68	72

Figure 2A: South Dakota Unweighted Restraint Use by Year for Higher Population Counties

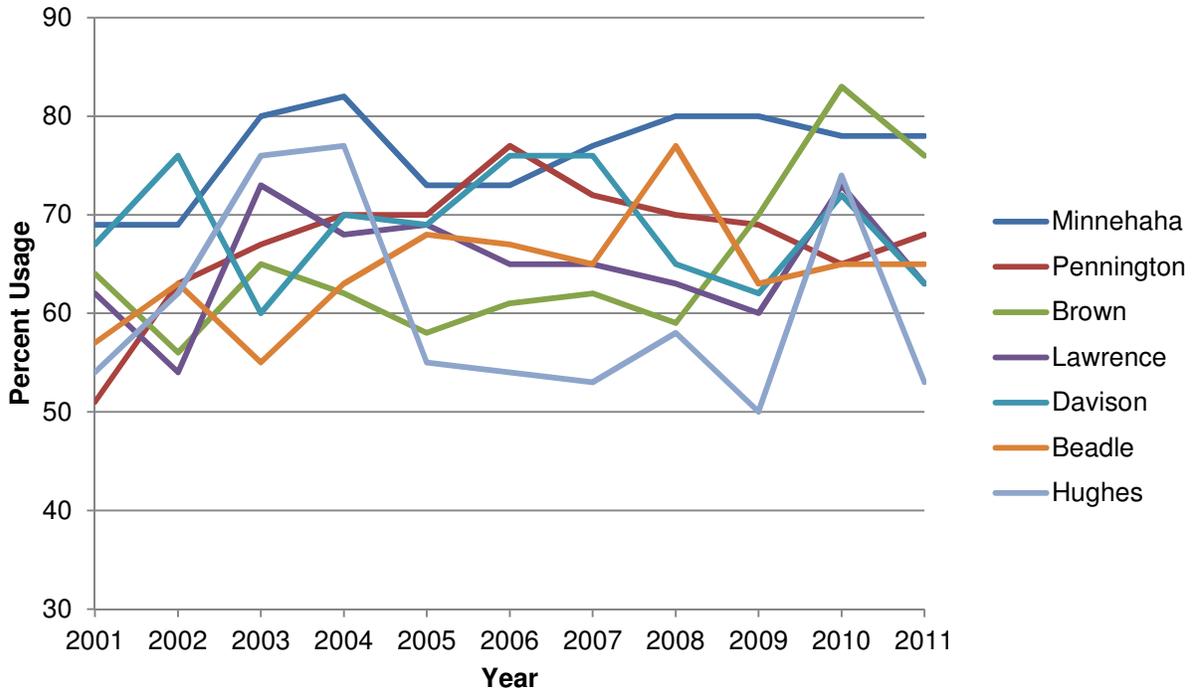
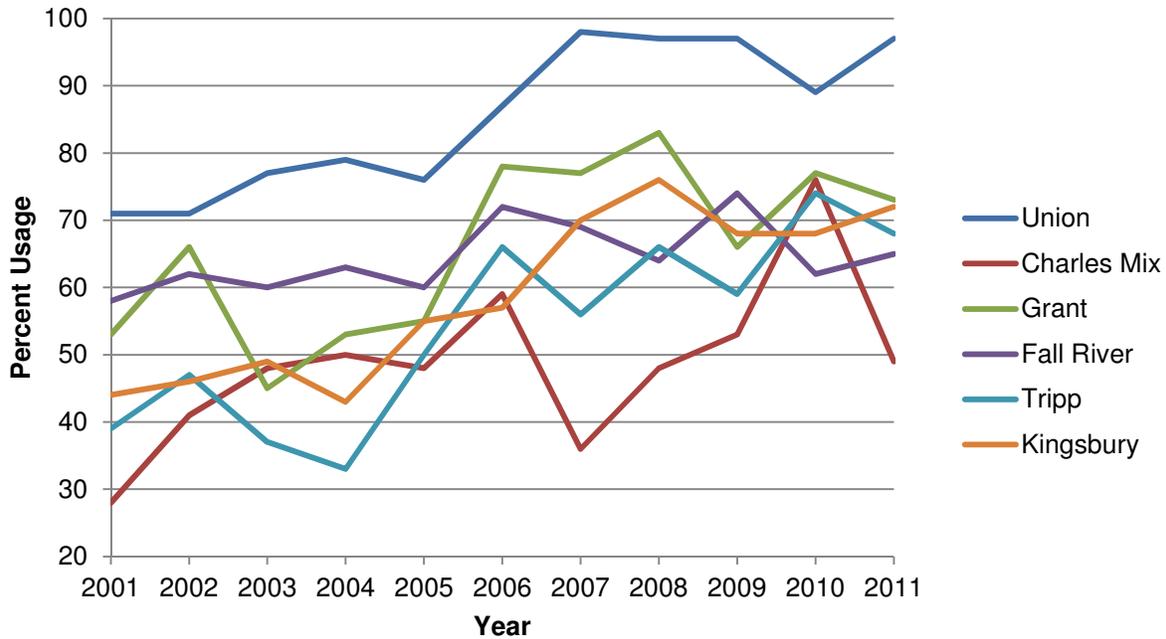


Figure 2B: South Dakota Unweighted Restraint Use by Year for Lower Population Counties



Unweighted Seatbelt Use by Age of Motorist

Observers estimated the age of drivers and passengers to the best of their ability. In approximately 39 or .3% instances, the Observer was unable to determine age. These instances were excluded from the age by restraint use analyses. As in all previous

Table 6: South Dakota 2011 Unweighted Restraint Use by Age

Age	Restraint Use			Total
	Belt	Child Restraint	None	
0 - 4 years	7 8.2%	70 82.4%	8 9.4%	85
5 - 13 years	65 68.4%	0 0.0%	30 31.6%	95
14 - 17 years	604 72.1%	0 0.0%	234 27.9%	838
18 + years	6092 69.1%	0 0.0%	2729 30.9%	8821
Total	6768 68.8%	70 0.7%	3001 30.5%	9839

surveys since 1998, Observers always recorded data for the driver and a right front passenger, irrespective of age. In subsequent survey years (2000 – 2011), data were also recorded for additional passengers between 0 - 4 years of age in the front seat (e.g., on the right front passenger's lap or in the middle of the seat) and in the back seat. This new protocol was adopted in order to increase the sample size of child passengers aged 0 - 4 years for better estimates of child restraint use.

A total number of 85 children in the 2011 survey were judged to be between 0 - 4 years of age. Of these, 77 or 90.6% were observed in some type of safety restraint. In accordance with South Dakota law, 70 or 82.4% were placed in a child safety seat, and another 7 (8.2%) were wearing a shoulder restraint, but were not seated in a child safety seat. This total restraint use rate of 90.6% is up markedly from last year's rate of 82.0%.

Comparing the number of children in safety restraints from survey year to year should be done with caution as the numbers fluctuate due to small sample sizes of less than 100 children. However, as can be seen in Table 7 and Figure 3, there is a clear trend over time for increasing protection of children younger than five. Since 2000, the rates have increased from 58% into the 80% range by 2006 and breaking into the 90% for the first time in 2011.

In the 2011 survey, a total of 95 children judged to be age 5 - 13 were observed. Of these, 65 or 68.4% were wearing a seatbelt. The remaining 30 (31.6%) were unrestrained. The restraint usage rate for this age group is down slightly from the 72.2% rate observed in the 2010 survey.

Table 7 and Figure 3 show the restraint use for children 5 - 13 each year since the 2000 survey. Despite fluctuating rates due to small sample sizes for this age group, there is a clear trend for increased restraint use over time. Rates have climbed from a low of 51% in 2000 to several rates in the 70% range since 2008. The 2011 rate of 68% is within 6 points of the historical high of 74% for this age group.

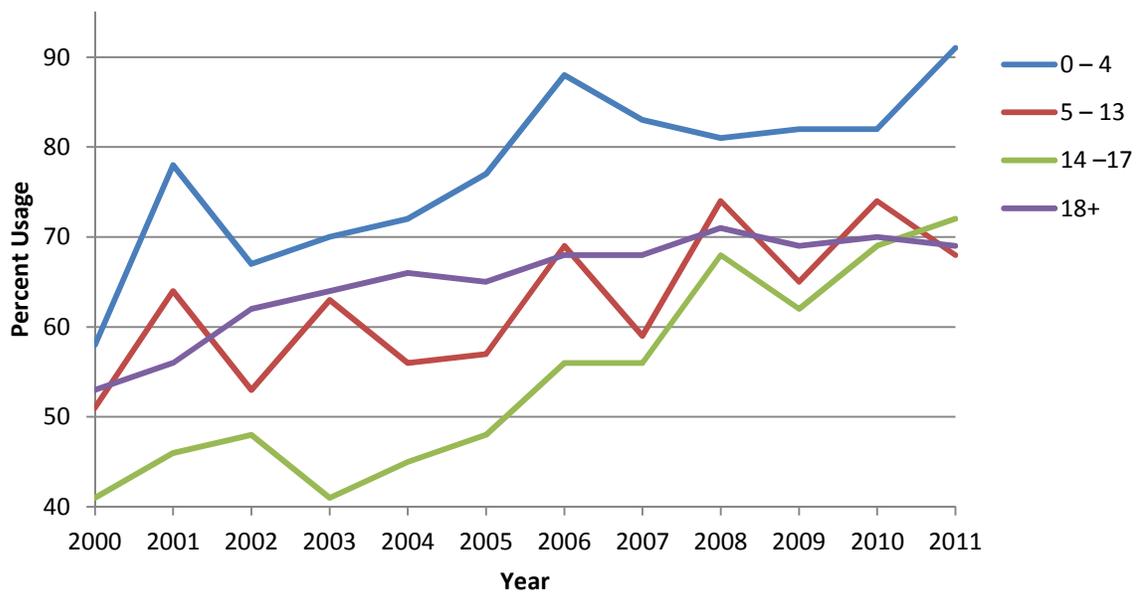
A total of 838 motorists were judged to be in the teenage category of 14 - 17 years. Of these teens, 604 or 72% were wearing a seatbelt. The 72% rate is a modest but important increase from the 2010 rate of 69%. As can be seen in Table 7 and Figure 3, restraint use for teens has shown a dramatic increase over time. From a record low of 41% observed in 2000, rates climbed slowly into the 50% range by 2006, then into the 60% range by 2008, and reached a record high of 72% in 2011.

The majority of observed motorists (a total of 8,821) were estimated to be in the age group of 18 years and older. Of these, 6,092 (69%) were wearing a restraint. The adult restraint usage rate in 2010 was similar (70%). Table 7 and Figure 3 demonstrate that, adult seatbelt use rates have increased from 53% in 2000 into the 60% range by 2002 and the 70% range by 2008. The 69% adult seatbelt use rate for 2011 was within a few percentage points of the historical high of 71% observed for this age group in 2008.

Table 7: South Dakota Unweighted Percent Restraint Use by Age by Year

Age	Year											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0-4	58	78	67	70	72	77	88	83	81	82	82	91
5-13	51	64	53	63	56	57	69	59	74	65	74	68
14-17	41	46	48	41	45	48	56	56	68	62	69	72
18+	53	56	62	64	66	65	68	68	71	69	70	69

Figure 3: South Dakota Unweighted Restraint Use by Year and Age Group



Unweighted Seatbelt Use for Drivers versus Passengers

In accordance with national guidelines, data were recorded for all drivers and right front seat passengers of any age. For the SD Office of Highway Safety purposes, data were also recorded for additional children under the age of five sitting in the middle front seat, on laps of right front passengers, and in the back seat. Unweighted data for restraint use by occupant position in the vehicle are presented in Table 8.

Restraint use was somewhat higher for passengers than for drivers. Of the 7,290 drivers observed, 5,032 or 69.0% were wearing a safety restraint. This rate is the same as the rate of 69.0% observed in the 2010 survey. Of the 2,479 right front passengers observed in the 2011 survey, 1,740 or 70.2% were wearing shoulder restraints. This rate is marginally lower than the 2010 rate of 71.5% for right front passengers.

According to federal and state guidelines, children 0 - 4 years of age should be placed in a child safety restraint in the back seat, where possible. Recall from the previous section that a total of 85 children in this age group were observed. Of these 85 children, 69 or 81% were riding in the back seat. Of these 69 children riding in the backseat, 63 or 91.3% were restrained in the mandated child safety seat. Three children (4.3%) in the backseat were wearing a seatbelt and three children (4.3%) were not wearing a restraint.

Data were recorded for seven additional child front seat passengers who were sitting in the middle of the front seat or on laps of right front passengers. Five (71.4%) of these seven children were seated in a child safety seat or restrained with a seatbelt and two (28.6%) were unrestrained.

Table 8: South Dakota 2011 Unweighted Restraint Use for Drivers vs. Passengers

Occupant Type	Restraint Use			Total
	Belt	Child Restraint	None	
Driver	5032 69.0%	0 0.0%	2260 31.0%	7292
Right-Front Passenger	1740 70.2%	2 0.1%	737 29.7%	2479
Additional Child-Front Passenger	0 0.0%	5 71.4%	2 28.6%	7
Child Passenger-Back Seat	3 4.3%	63 91.3%	3 4.3%	69
Total	6775 68.8%	70 0.7%	3002 30.5%	9847

Unweighted Seatbelt Use for Vehicle Type

Only non-commercial vehicles were observed. In 2006 surveys and all previous years, vehicles had been categorized into three classifications: 1) cars; 2) vans, mini-

vans, pickups and station wagons; and 3) Sport Utility Vehicles (SUVs). Starting with the 2007 survey, pickup trucks were coded in a separate category as research indicated that restraint use is lower in pickup trucks.

Table 9 presents a summary of data regarding restraint use by vehicle type. Combining seatbelt and child safety seats, restraint usage was highest (80%) for vans, minivans, and station wagons. The next highest usage rate (73%) was observed for SUVs, followed closely by cars (72%). As in previous years, the lowest usage rate of all vehicle types was observed for pickup trucks – 58%.

Table 9: South Dakota 2011 Unweighted Restraint Use by Vehicle Type

Vehicle Type	Restraint Use			Total
	Yes	Child Restraint	None	
Cars	2644 71.4%	30 0.8%	1031 27.8%	3705
Vans	1086 78.5%	18 1.3%	279 20.2%	1383
SUVs	1489 72.4%	15 0.7%	554 26.9%	2058
Pickups	1558 57.6%	7 0.3%	1141 42.2%	2706
Total	6777 72.8%	70 0.7%	3005 30.5%	9852

Unweighted Seatbelt Use for In-State versus Out-of-State Vehicles

Consistent with previous years, the majority of motorists had in-state license plates (84% or 8,252 out of 9,834). As shown in Table 10, motorists with out-of-state license plates had higher rates of restraint use (81%) for seatbelts and child safety restraints combined than did motorists traveling in vehicles with in-state license plates (67%).

Table 10: South Dakota 2011 Unweighted Restraint Use by In- and Out-of-State License Plates

License Plates	Restraint Use			Total
	Belt	Child Restraint	None	
In-State	5489 66.5%	66 0.8%	2697 32.7%	8252
Out-of-State	1278 80.8%	4 0.3%	300 19.0%	1582
Total	6767 68.8%	70 0.7%	2997 30.5%	9834

Motorcycle Helmet Use

As in 2010, observations of helmet usage by motorcycle drivers and passengers in 2011 were recorded in the general survey and for a supplemental survey taken to increase the representativeness of the motorcycle data. A total of 2,261 motorcycle riders were observed—a good comparison to the sample size of 2,144 in 2010.

Weighted Estimate of Statewide Helmet Use

The same procedures for calculating the statewide estimate for seatbelt use were applied to the motorcycle observations. See page 16 for a description of the process and Appendix E for a copy of the calculations. The weighting formula was modified to account for sites with missing data resulting from the scarcity of motorcycle traffic at some sites in nearly every county. Because of these missing data, the statewide estimate for helmet use is not as reliable as the statewide estimate for seatbelt use.

The resulting estimate for helmet use on all South Dakota roads was 50.8 with a standard error of 0.57768. Thus, it can be said that there is a 95% probability that the true rate of helmet use for South Dakota roads ranges between 49.3% and 52.3%. The rate of 50.8% is 2.6 points lower than the rate of 53.4% observed in 2010. This difference was statistically significant, $t_{(60)} = -17.00$; $p < .001$.

Weighted Estimate of Statewide Helmet Use by Road Type

The 2011 weighted statewide estimates for seatbelt use by road type (see Table 11) was 41.5% for urban highways, 45.6% for rural highways, 37.9% for urban interstates, and 59.4% for rural interstates. There were statistically significant changes in helmet use for all four road types compared to the previous survey year. The urban highway rate of 41.5% was 6 points higher than the 35% rate in 2010, $t_{(14)} = 36.43$; $p < .001$. The rural highway rate of 45.6% was 14 points lower than the 59.2% rate in 2010, $t_{(26)} = -0.87$; $p < .001$. The urban interstate rate of 37.8% was 5 points higher than the 32.6% rate in 2010, $t_{(10)} = 28.29$; $p < .001$. Finally, the rural interstate rate of 65.9% was 6 points higher than the 59.4% rate in 2010, $t_{(10)} = 20.44$; $p < .001$.

Table 11. South Dakota Weighted Percent Helmet Use by Year and Road Type

Road Type	Year	
	2010	2011
Urban Highway	35.0	41.5
Rural Highway	59.2	45.6
Urban Interstate	32.6	37.9
Rural Interstate	59.4	65.9
Statewide Average	53.4	50.8

Unweighted Helmet Use for All Riders

Of the 2,261 motorcyclists observed, 961 or 42% were wearing helmets. This compares to a 45% unweighted rate for all riders in 2010. Note that these rates are unweighted for road type and VMT and are not as representative as the weighted statewide helmet use estimates (50.8% for 2011 and 53.4% for 2010).

Unweighted Helmet Use by County

Unweighted helmet usage by county by descending population size is in Table 12. Unweighted helmet use rates from highest to lowest for counties were Tripp (64%), Fall River (60%), Brown (59%), Union (51%), Pennington (49%), Lawrence (42%), Beadle (41%), Hughes (40%), Grant (39%), Minnehaha (33%), Davison (32%), Kingsbury (29%), and Charles Mix (19%).

See Table 13 for a comparison of unweighted helmet use rates by counties for years 2010 and 2011. Compared to rates observed in 2010, helmet use rates in 2011 were the same or within two percentage points for five counties -- Brown, Beadle, Union, Charles Mix, and Fall River. Rates were higher for four counties -- Minnehaha (+8), Pennington (+5), Hughes (+11), and Tripp (+19), and lower in four counties -- Lawrence (-21), Davison (-7), Grant (-3), and Kingsbury (-12).

Overall, helmet use rates were stable or fluctuated moderately in most counties between 2010 and 2011. The 19-point drop in Tripp County was based on small sample sizes (31 in 2011 and 49 in 2010). However, the 21-point drop in Lawrence County was based on large sample sizes (524 in 2011 and 350 in 2010), indicating that helmet use did substantially decline in this county.

Table 12: South Dakota 2011 Helmet Use by County

County	Helmet Use		Total
	Yes	No	
Minnehaha	91 33.2%	183 66.8%	274
Pennington	188 48.7%	198 51.3%	386
Brown	83 58.9%	58 41.1%	141
Lawrence	222 42.4%	302 57.6%	524
Davison	48 31.8%	103 68.2%	151
Beadle	53 40.8%	77 59.2%	130
Hughes	31 40.3%	46 59.7%	77
Union	119 51.1%	114 48.9%	233
Charles Mix	4 19.0%	17 81.0%	21
Grant	56 38.9%	88 61.1%	144
Fall River	6 60.0%	4 40.0%	10
Tripp	20 64.5%	11 35.5%	31
Kingsbury	40 28.8%	99 71.2%	139
Total	961 42.5%	1300 57.5%	2261

Table 13: South Dakota Unweighted Percent Helmet Use by County by Year

County	Year	
	2010	2011
Minnehaha	25	33
Pennington	44	49
Brown	60	59
Lawrence	63	42
Davison	39	32
Beadle	42	41
Hughes	29	40
Union	50	51
Charles Mix	21	19
Grant	42	39
Fall River	62	60
Tripp	45	64
Kingsbury	41	29

Unweighted Motorcycle Helmet Use by Age of Rider

Of the 2,241 motorcyclists observed whose age could be estimated, 2,149 (96%) were estimated to be 18 years of age or older. Of the remaining, 91 or 4% were teens aged 14 – 17, 1 or <.1% were aged 5 - 13 years and no children under 5 were present on motorcycles. As illustrated in Table 14, the 1 child aged 5-13 years observed riding on a motorcycle was wearing a helmet. Helmet usage among teens aged 14 - 17 was observed in 45 of 91 or 50% of riders. This is lower than the teen helmet use rate of 55% observed in 2010. Helmet usage among adults was 896 of 2,149 or 42%, slightly lower than the 44% adult rate in 2010.

Table 14: South Dakota 2011 Helmet Use by Age

Age	Helmet Use		Total
	Yes	No	
0 - 4 years	0 0.0%	0 0.0%	0
5 - 13 years	1 100.0%	0 0.0%	1
14 - 17 years	45 49.5%	46 50.5%	91
18 + years	896 41.7%	1253 58.3%	2149
Total	942 42.0%	1299 58.0%	2241

Motorcycle Helmet Use Unweighted Estimate for Drivers and Passengers

As illustrated in Table 15, helmet use was higher among passengers than drivers. Of the 483 passengers observed, 245 or 51% were wearing helmets. For the 1,778 drivers observed, helmets were worn by only 716 or 40%.

Table 15: South Dakota 2011 Unweighted Statewide Helmet Use

Motorcycle Riders	Helmet Use		Total
	Yes	No	
Driver	716 40.3%	1062 59.7%	1778
Passenger	245 50.7%	238 49.3%	483
Total	961 42.5%	1300 57.5%	2261

Motorcycle Helmet Use Unweighted Estimate by License State

As shown in Table 16, most of the motorcyclists had South Dakota license plates—1,614 or 72%. Similar to the finding for seatbelt data, a lower percentage of in-state riders wore helmets (35%) than did riders with out-of-state license plates (60%).

Table 16: South Dakota 2011 Helmet Use by License State

License State	Helmet Use		Total
	Yes	No	
In-State	568 35.2%	1046 64.8%	1614
Out-of-State	387 60.4%	254 39.6%	641
Total	955 42.4%	1300 57.6%	2255

Summary and Discussion

Seatbelt Use

Statewide Weighted Rates. Results of the survey established that the weighted statewide estimate of restraint use in South Dakota in 2011 was 73.4%. This rate is 1.1% lower than the statewide rate of 74.5% observed in 2010 – a statistically significant difference. Further analyses showed statistically significant changes for seatbelt use on all four road types. Seatbelt use declined by 7 points on urban highways (67.1% in 2011 versus 74.3% in 2010); 4 points on rural highways (67.1% in 2011 versus 71.5% in 2010), and 2 points on urban interstates (75.8% in 2011 versus 73.7% in 2010). These declines were counteracted by a 7% increase in seatbelt use on rural interstates (86% in 2011 versus 79% in 2010).

Given that seatbelt use in South Dakota reach a historical high rate of 74.5% last year, how should the 1% decline be interpreted? It is possible that seatbelt use on South Dakota roads has reached a temporary plateau and is fluctuating around the 74% level. However, it is also possible that unusual traffic patterns of the 2011 sample depressed seatbelt use rates. This year there were 2,500 fewer motorists observed in the survey (9,846 in 2011 compared to 12,391 in 2010). There was a related decrease in the proportion of out-of-state travelers (16% in 2011 versus 19% in the 2010 and 2009 surveys). Because seatbelt use by out-of-state travelers (81%) is substantially higher than use by travelers with in-state license plates (67%), a 3% decline in out-of-state motorists could explain the slight decline in seatbelt use rates. Another survey of seatbelt use in 2012 will help resolve these questions.

Despite the small decline from last year, the 2011 statewide seatbelt use rate of 73.4% should be viewed as positive news. The current seatbelt rate is higher than all statewide rates observed in surveys from 2000 to 2009. More good news is that the 86% statewide seatbelt use rate for rural interstates increased from 2010 and is now at the second highest level since the surveys began in 2000. (The historic high seatbelt use rate for rural interstates remains 87% observed in 2007.)

Unweighted Seatbelt Rates by County. The statewide estimates of seatbelt use are calculated to be representative of seatbelt use on all highways throughout South Dakota. These estimates, however, are influenced by the unique histories of seatbelt use in the thirteen counties selected to represent the state. The unweighted 2011 seatbelt use rates for counties by descending population size were: Minnehaha (78%), Pennington (68%), Brown (76%), Lawrence (63%), Davison (63%), Beadle (65%), Hughes (53%), Union (97%), Charles Mix (49%), Grant (73%), Fall River (65%), Tripp (68%), and Kingsbury (72%). Compared to rates in 2010, seatbelt use rates stayed the same for Minnehaha and Beadle counties, increased for the four counties of Pennington (+3), Union (+8), Fall River (+3), and Kingsbury (+4), and decreased for the seven counties of Brown (-7), Lawrence (-10), Davison (-9), Hughes (-21), Charles Mix (-27), Grant (-4), and Tripp (-6).

The fluctuating rates of county seatbelt use are best understood by looking at county trends over the 11 survey years. For higher population counties, the data show the highest and most steady use rates for Minnehaha, the state's most populated county. Located near the SD mid- eastern border, Minnehaha has the city of Sioux Falls where Interstates 29 and 90 conjoin. Starting with rates near 70% in 2001, Minnehaha rates have hovered near the 80% level since 2008. On the opposite western state border, the second most populated county of Pennington has had seatbelt rates that are about 10% lower than those in Minnehaha. Rates in Pennington, which has Rapid City and an Interstate 90 roadway, have risen from 51% in 2001 to the high 60% level in recent years. Being part of the Black Hills tourism area and the "West River" independent rural culture most likely affects seatbelt use in this county.

The state's third most populated county Brown with the city of Aberdeen is located near the north central border. Brown's seatbelt rates were in the high 50% to low 60% range in the early survey years, but have broken into the 70% and 80% levels since 2009. Lawrence County, affected by similar factors as neighboring Pennington, has had rates in the 60% range with breakthroughs to the 70% range in 2003 and 2010. Davison, an east river county with the city of Mitchell and Interstate 90, has had fluctuating rates in the low 60% to mid-70% range. Beadle County, located near Davison, has maintained rates in the mid-60% level with one breakthrough to 70% in 2008. In centrally-located Hughes County with its capitol city of Pierre, rates have shifted dramatically from the 50% to the 70% range throughout the survey years. Factors affecting Hughes rates include rural West River culture and Missouri River tourism and recreation.

For lower population counties, Union County has proved to be the state's beacon of high seatbelt use. Located in the southeastern corner of SD near the Missouri River, this small county is the conduit for Interstate 29 traffic to and from the urban area of Sioux City, Iowa. The forces of high traffic volume and traffic laws of Iowa influence Union County seatbelt use. Rates in Union County rose from the 70% level in 2001 into the 80% range by 2006 and the 90% range by 2007. Union is the only county of the survey that been within two points of a 100% seatbelt use rate. In great contrast to Union is Charles Mix, a small county in the south central area of SD near the Missouri River. This county has consistently showed very low seatbelt rates in the 30% range in the early survey years, but has since moved into the high 40% and low 50% range. Charles Mix had a breakthrough to the 70% range of seatbelt use in 2010.

Grant County, located in northeast SD, has shown improved seatbelt use rates from lows in the 50% and 40% range in the early survey years to breakthroughs into the 70% and even 80% levels since 2006. Fall River, located in the southern rural area of the Black Hills, is similar to Lawrence and Pennington in having fairly steady rates in the 60% range. Fall River had breakthroughs into the 70% range in 2006 and 2009. Tripp, a very rural county in south central SD, is similar to Charles Mix in having some of the lowest seatbelt rates of the survey. Rates in Tripp have increased, however, from the 30% range to the upper 50% and 60% range since 2006. Tripp had a breakthrough into the 70% range in 2010. Finally, the smallest survey county of Kingsbury, located in

mid-eastern SD, is similar to Grant in showing steady improvement in seatbelt use from the 40% range in early survey years to the 70% and high 60% range since 2007.

In summary, in the survey years of 2001 through 2011, one county – Union—has achieved seatbelt use in the 90% level, three counties have reached seatbelt use in the 80% range (Minnehaha, Brown, and Grant) and all nine remaining counties have reached a seatbelt use rate in the 70% range since 2006. As noted in last year's report, seatbelt use rates in the diverse regions of South Dakota are increasingly higher and more uniform over time.

Restraint Use by Age. Positive news from the 2011 survey is that children judged to be younger than age five had an unweighted restraint use rate of 91%, up from the 82% rate in 2010. The 91% rate for children under age five is an historical high in the twelve years of the survey. The survey also showed that 82% of children (70 of 85 children) judged to be under age five had the mandated protection of a car seat. This rate is up substantially from the 66% car seat use rate observed in last year's survey. Sixty nine of the 85 children under five (81%) had the extra protection of being placed in the back seat. This year seven children who appeared to be under age five were observed in the middle position in the front seat. Of these, 71% were in a child seat. This is an improvement over last year's survey in which all eight children in the middle front seat position had no seatbelt or car seat protection.

Seatbelt use for children judged to be age five to thirteen had a seatbelt use of 68%, down 6 points from the 2010 rate of 74%. Seatbelt use for youth who appeared to be age 14 to 17 increased from 69% in 2010 to 72% in 2011. This rise of a few points is nonetheless a meaningful survey finding. For the first time in all survey years, teen seatbelt use has broken into the 70% range. Compared with all other age groups, the teen seatbelt use has been the lowest and the slowest to change. This low seatbelt rate has put a significant number of teens at risk to death and injury in car accidents. According to Farmer et al. (2010), 16 year-old drivers are involved in significantly more crashes than slightly older drivers age 18 to 19 years. Reaching an historic high of 72% seatbelt use for this high risk teen age group is an important achievement .

As found in past surveys, the 2011 survey revealed that seatbelt use of occupants of pickup trucks (58%) was substantially lower than for cars (72%), SUV's (73%) and vans and station wagons (80%). According to NHTSA, the low rate of seatbelt use in pickup trucks occurs in all parts of the country. Nation-wide surveys in 2010 revealed that the pickup rate was 74% compared to 86% for cars and 87% for vans and SUVs (Pickrell & Ye, 2010a.) Strine et al. (2010) suggest that pickup truck use, particularly by male drivers, is a major factor in low seatbelt use in rural areas. They report that some states originally exempted pickup occupants from seatbelt laws—a reflection of the cultural norm that pickup drivers do not need seatbelt protection. As noted in our previous survey reports, promoting seatbelt use among pickup drivers and passengers is a constant challenge for South Dakota safety advocates.

Motorcycle Helmet Use

History of the SD Motorcycle Survey. This is the third year that helmet use was measured as part of the South Dakota Seatbelt Survey. In 2009, we had Observers add motorcycles as a vehicle type to the regular automobile survey conducted in early June. This method produced a sample of only 530 motorcycles. We were able to add 504 motorcycles in a supplemental survey in Minnehaha and Pennington counties in late June. Combined results showed that 36% of observed cyclists wore helmets (34% for drivers and 42% for passengers). We were unable to conduct a statewide estimate due to missing data from many sites throughout the 13 counties. Only three counties had more than 100 motorcyclist observations and seven counties had 20 or fewer motorcyclist observations.

In 2010 the survey we expanded the supplemental motorcycle survey to all 13 counties. The sample size from the two survey periods was 2,122 motorcyclists. Ten counties had observations of 100 or more motorcyclists and the lowest county sample size was 34. The sample sizes by county were large enough to compute a statewide estimate of motorcycle helmet use of 53%. This year we replicated the procedures from 2010 and obtained data for 2,261 motorcyclists. We now had two years of data in which to compare estimates of statewide helmet use. However, because motorcycle traffic is light and sometimes non-existent on many roadways, some sites in nearly all counties had zero motorcycle observations. These missing data make the statewide estimates of helmet use less reliable than the statewide estimates for seatbelt use.

Weighted Statewide Rates for Helmet Use. A statewide estimate of 50.8% helmet use was observed for motorcycle drivers and passengers. This rate is 2.6 points lower than the 53.4% rate observed in 2010 – a difference that is statistically significant. Statewide rates by road type were 41.5% for urban highways, 45.6 %for rural highways, 37.9% for urban and 65.9% for rural interstates. Compared to 2010, helmet use increased significantly on three road types – urban highways (up 6 points from 35.0%), urban interstates (up 5 points from 32.6%), and rural interstates (up 6 points from 59.4%). These gains were counteracted by a decrease of 14 points on rural highways (down from 59.2%).

Does this difference mean that there is a declining trend of helmet use in South Dakota? It is hard to tell with only two years of survey results. However, the data suggest that there was a meaningful change in helmet use from last year. The steep 14 point decline in the statewide estimate of helmet use on rural highways between 2011 (45.6%) and 2010 (59.2%) appears to be a reliable finding. This decrease occurred even though the proportion of out-of- state motorcyclists (who have higher helmet use rates than in-state riders) was higher (28%) in 2011 than in 2010 (24%). In addition, the large 21-point drop in Lawrence County (63% in 2010 to 42% in 2011) indicates that helmet use declined in the rural Black Hills area. Whether these declines are true trends or just annual fluctuations can only be determined by more surveys in the coming years.

Unweighted Helmet Use by County. The unweighted helmet use rates for counties by descending population size were: Minnehaha (33%), Pennington (49%), Brown

(59%), Lawrence (42%), Davison (32%), Beadle (41%), Hughes (40%), Union (51%), Charles Mix (19%), Grant (39%), Fall River (60%), Tripp (64%), and Kingsbury (29%). Compared to rates observed in 2010, unweighted helmet use rates in 2011 were the same or within two percentage points for five counties -- Brown, Beadle, Union, Charles Mix, and Fall River). Rates were higher for four counties -- Minnehaha (+ 8), Pennington (+5), Hughes (+11), and Tripp (+19), and lower in four counties – Lawrence (-21), Davison (-7), Grant (-3), and Kingsbury (-12).

One pattern is that the helmet use rate in the heavily populated Minnehaha County was in the low 25% to 30% range for the second year in a row. It is interesting that a county with one of the highest seatbelt use rates would have one of the lowest helmet use rates. One reason could be that motorcycle riders in Sioux Falls are traveling short distances on the local highways and interstate roads and do not feel the need for helmet protection. However, the helmet use rate for Brown County, another east river county with an urban center, had high rates near 60% rates for two years in a row. In between these two extremes are Pennington and Lawrence counties who had helmet use rates of 49% and 42%, respectively. Here the West River cultural norm of riding helmet free competes with the need for protection on dangerous mountainous roadways—the result this year being a moderate level of helmet use.

Unweighted Helmet Use by Age. Over 95% of motorcycle riders were judged to be of adult age. Of these, 42% were wearing helmets. Because South Dakota has no helmet requirement for adult riders, these motorcyclists were in compliance with the law. However, only 50% of riders who appeared to be age 14 - 17 were wearing helmets. Because South Dakota has a legal requirement that motorcycle riders age 17 and under wear helmet protection, this survey suggests that about half of teen riders are not in compliance with the law. This may help explain why researchers are finding that motorcycle riders age 12 – 17 suffer significantly greater motorcycle- accident related brain injuries in states that have youth-specific helmet laws (like South Dakota) as compared to states with a universal helmet law (Weiss et al., 2010.)

Retrospective on Survey Influences

Each year we review extraneous factors that potentially influenced the outcome of the South Dakota seatbelt and motorcycle helmet use survey. Considering methodological factors, we were fortunate again this year to have the same set of individuals from the South Dakota Emergency Medical Technician organization serve as traffic observers. This is the seventh year in a row that the same group of men and women have agreed to take on this responsibility to watch traffic despite obstacles of weather, construction, and flood conditions. Having this level of Observer consistency and expertise is extremely valuable and lends great reliability to our survey results. Methodology was affected by the great flood of the Missouri this year. We had to substitute several sites for flooded areas in Pierre and Union County—a minor change.

This year the major external factor affecting survey results was the reduced traffic on South Dakota roads. There were 2,500 fewer motorists observed in this 2011 survey as compared to last year and previous years. This sharp reduction can be explained by

“record rainfall, flooding, rising gasoline prices, and slow economy, and a season of seemingly never-ending storms”, according to a newspaper article about reduced tourism in the Black Hills in June and July.(Slow start, July, 2011). According to the article, SD DOT traffic counters on I 90 in Rapid City showed decreases of 11% in May compared to last year. Our survey results showed big declines of motorists in Pennington and Brown Counties. As noted previously, we found a related 3% decline in the proportion of out-of-state to in-state motorists between the 2010 and 2011 surveys. Because out-of-state motorists have seatbelt use in the 80% range in our surveys, the loss of these motorists from our 2011 survey base may be reflected in the slight decline in the statewide seatbelt use estimate for the state.

The Future

Seatbelt Use. Will South Dakota be able to break through to a higher level of seatbelt use in the years to come or will rates stabilize or possibly decrease? We ask this question each year knowing that answers will only be revealed in future surveys. In 2010, the national seatbelt use rate for the nation was 85% -- far above the South Dakota statewide rate of 73.4%. Closer to South Dakota rates, and a more realistic goal for safety advocates, is the 81% seatbelt use observed in Midwestern states and rural areas (Pickrell & Ye, 2010a). A rise of 8 percentage points would put South Dakota seatbelt use at the national level for states that share our geographical and rural characteristics.

What forces of change could increase South Dakota seatbelt rates? There are interesting new developments in technology that may potentially affect seatbelt use. Researchers have documented that installation of “enhanced seat belt reminders” (e.g., warning beeps that the seatbelt is not fastened) is related to reduced fatality rates (Farmer & Wells, 2010). Another device that prevents drivers from shifting a vehicle into gear for up to 8 seconds unless seat belts are buckled was found to increase seatbelt use from 48% to 67% in an experiment using U.S. commercial drivers (Van Houten et al., 2010). New research has found that “in-vehicle monitoring” of risky behaviors including not using seatbelts increased seatbelt use among teenage drivers. The electronic device set off warning alerts in the vehicle and also reported violations on a website viewed by parents (Farmer, Kirly & McCartt, 2010).

Until these technological devices are routinely used, one sure avenue for change is the continued use of traffic safety education and awareness campaigns such as “Click It or Ticket”. A recent evaluation of this campaign in Utah that used media and highly visible seatbelt enforcement was related to an 8% increase in seatbelt use (Thomas, Cook & Olson, 2011). The South Dakota Office of Highway Safety (OHS) has used the Click It campaign for several years. According to a newspaper article, the OHS recently launched a “more aggressive” ad campaign featuring a baby in a car seat being the only one left safe in a vehicle after a crash. The purpose of the campaign, according to Director Lee Axdahl, is to get people to think about what really happens in a crash and to buckle up for the benefit of others (Year off to a safer start, 2011).

Most traffic safety and health advocates agree that the fastest and most effective way to increase seatbelt use is to pass legislation – especially a primary enforcement law for seatbelt violations (Beck & West, 2011). Strine et al. (2010) reported that states with a primary enforcement law have nearly 9% higher seatbelt use rates than states with secondary enforcement. These researchers report that upgrading a secondary enforcement law to a primary enforcement law has been found to be especially effective in rural areas. According to the National Highway Traffic Safety Administration, as cited by Strine et al., 2010, there are five elements of a strong seatbelt law:

- 1) The law allows primary enforcement
- 2) It has penalties (monetary fines or points on licenses)
- 3) It includes all types of vehicles
- 4) All seating positions in the front and back seat are covered
- 5) The amount of personal injury damages awarded to a crash victim is reduced for those not wearing a seatbelt.

Although recent legislative efforts to strengthen South Dakota's seatbelt laws have not gone forward, success may be achieved in a future legislative session.

Helmet Use. The current statewide rate of helmet use of 50.8% is only a few points lower than the national rate of 54% reported by NHTSA for 2010. South Dakota's current helmet use rate is actually *higher* than the helmet use rate of 43% reported by NHTSA for the Midwestern region. However, matching the national helmet use rates of 2010 may not be such an accomplishment given that there were steep declines in nation-wide helmet use that year. According to Pickerell & Ye (2010b), helmet use the previous year of 2009 had been as high as 67%. Drops by as much as 13 to 20 points were observed in all regions of the country. The causes of these declines are unknown, but the future of South Dakota helmet use rates may be shaped by this national trend.

Many safety and health advocates agree that the most effective way to increase helmet use is to legislate universal helmet laws (MacLeod, et al., 2010). States with universal helmet laws have achieved helmet use rates as high as 100% (Derrick & Faucher, 2009). Prospects for South Dakota once again mandating helmet use for all riders, however, seem unlikely due to the political and cultural controversies surrounding helmet laws in many states (MacLeod et al., 2010). Thus, education and motorcycle training courses continue to be major strategies for encouraging helmet use. In light of the 2011 survey results indicating that only half of teen riders are wearing helmets, perhaps stronger enforcement of the state's "youth specific" helmet law could make a difference.

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Appendix A

List of Observation Sites by Roadway Type

Urban Interstate

County	Road Mile	Site	Probability of #	Selection for County
Minnehaha	29N	77	2	.31
Minnehaha	29N	98	3	.31
Minnehaha	229	3	4	.31
Minnehaha	229	5	5	.31
Minnehaha	229	7	6	.31
Pennington	90E	56	11	.18
Pennington	90E	60	12	.18
Lawrence	90	13	2	1.00
Davison	90	330	8	1.00
Davison	90	333	10	1.00
Union	29S	.98	1	1.00

Rural Interstate

Minnehaha	90	379	13	.19
Minnehaha	90	390	14	.19
Minnehaha	90	412	15	.19
Pennington	90E	66	13	.31
Pennington	90E	90	14	.31
Pennington	90E	98	15	.31
Pennington	90W	55	16	.31
Pennington	90W	62	17	.31
Lawrence	90	12	1	1.00
Lawrence	90E	15	3	1.00
Lawrence	90E	27	4	1.00
Lawrence	90W	12	5	1.00
Lawrence	90W	15	6	1.00
Lawrence	90W	24	7	1.00
Davison	90	319	6	1.00
Davison	90	325	7	1.00
Davison	90	332	9	1.00
Union	29N	1	2	1.00
Union	29N	18	3	1.00
Union	29N	27	4	1.00
Union	29S	42	5	1.00
Grant	29	201	16	1.00

Urban Highway

Minnehaha	115	84	7	.70
Minnehaha	115	87	8	.70
Minnehaha	115	88	9	.70
Minnehaha	11	79	10	.70
Minnehaha	42	363	11	.70
Minnehaha	42	367	12	.70
Minnehaha	38	365	17	.70

Pennington		16	69	2	.18
Pennington		16B	68	3	.18
Pennington		16B	70	4	.18
Pennington		79	80	6	.18
Pennington		44	40	7	.18
Pennington		44	49	8	.18
Brown		12	289	4	1.00
Brown		12	290	5	1.00
Brown		12	292	6	1.00
Brown		12E	289	8	1.00
Brown		281	193	9	1.00
Brown		281N	197	14	1.00
Lawrence		14A	9	14	.13
Lawrence		14A	10	15	.13
Davison		37	74	3	.60
Davison		37	76	4	.60
Davison		38	300	12	.60
Beadle	37	125	13	1.00	
Beadle	37	127	14	1.00	
Beadle	37	128	15	1.00	
Hughes	14E	230	3	1.00	
Hughes	14W	232	5	1.00	
Hughes	14	229	6	1.00	
Hughes	14	230	7	1.00	
Hughes	14B	95	11	1.00	
Hughes	14B	96	12	1.00	
Hughes	34	209	13	1.00	
Hughes	34	210	14	1.00	

Rural Highway

Minnehaha		19	64	1	.07
Minnehaha		38	349	16	.07
Pennington		16	45	1	.10
Pennington		16A	59	5	.10
Pennington		44	87	9	.10
Pennington		44	107	10	.10
Lawrence		385	122	8	.66
Lawrence		85	28	9	.66
Lawrence		14A	29	10	.66
Lawrence		14A	35	11	.66
Lawrence		14A	37	12	.66
Lawrence		14A	41	13	.66
Lawrence		14A	41	16	.66
Lawrence		14A	50	17	.66
Brown		10	279	1	.55
Brown		10	282	2	.55
Brown		10	297	3	.55
Brown		12	309	7	.55
Brown		281	214	10	.55
Brown		281	214	11	.55
Brown	281S	185	12	.55	
Brown		281N	185	13	.55
Brown		37	207	15	.55
Brown		37	208	16	.55
Brown		37	208	17	.55

Hughes	83	138	1	.69	
Hughes	1804	256	2	.69	
Hughes	14	139	4	.69	
Hughes	14	246	8	.69	
Hughes	14	251	9	.69	
Hughes	14	263	10	.69	
Hughes	34	212	15	.69	
Hughes	34	232	16	.69	
Hughes	34	245	17	.69	
Davison		37	62	1	.83
Davison		37	72	2	.83
Davison		37	76	5	.83
Davison		42	302	11	.83
Davison		38	302	13	.83
Beadle	14	333	1	.83	
Beadle	14	354	2	.83	
Beadle	14	354	3	.83	
Beadle	14	363	4	.83	
Beadle	14	316	5	.83	
Beadle	14	326	6	.83	
Beadle	14	326	7	.83	
Beadle	14	331	8	.83	
Beadle	28	269	9	.83	
Beadle	28	283	10	.83	
Beadle	28	298	11	.83	
Beadle	281	117	12	.83	
Beadle	37	133	16	.83	
Beadle	37	145	17	.83	
Union		46	365	6	.88
Union		46	366	7	.88
Union		46	380	8	.88
Union		46	371	9	.88
Union		11	9	10	.88
Union		11	23	11	.88
Union		11	35	12	.88
Union		11	35	13	.88
Union		50	423	14	.88
Charles Mix		50	337	1	.88
Charles Mix		50	329	2	.88
Charles Mix		50	314	3	.88
Charles Mix		50S	299	4	.88
Charles Mix		50N	299	5	.88
Charles Mix		50	273	6	.88
Charles Mix		1804	90	7	.88
Charles Mix		1804	120	8	.88
Charles Mix		44	298	9	.88
Charles Mix		44	305	10	.88
Charles Mix		44	306	11	.88
Charles Mix		45	27	12	.88
Charles Mix		46	277	13	.88
Charles Mix		46	288	14	.88
Charles Mix		46	290	15	.88
Grant		20	439	1	1.00
Grant		20	439	2	1.00
Grant		20	446	3	1.00
Grant		158	439	4	1.00

Grant	12	377	5	1.00
Grant	12	388	6	1.00
Grant	12	390	7	1.00
Grant	12	390	8	1.00
Grant	12	399	9	1.00
Grant	123	172	10	1.00
Grant	15	160	11	1.00
Grant	15	167	12	1.00
Grant	15	174	13	1.00
Grant	15	174	14	1.00
Grant	15	175	15	1.00
Fall River	18	62	1	.65
Fall River	18	11	2	.65
Fall River	18	12	3	.65
Fall River	18	24	4	.65
Fall River	471	7	5	.65
Fall River	471	21	6	.65
Fall River	471	27	7	.65
Fall River	89	29	8	.65
Fall River	71	1	9	.65
Fall River	71	2	10	.65
Fall River	71	7	11	.65
Fall River	71	27	12	.65
Fall River	71	35	13	.65
Fall River	385	39	14	.65
Fall River	79	26	15	.65
Fall River	385	12	16	.65
Fall River	385	13	17	.65
Tripp	53	26	1	1.00
Tripp	183S	5	2	1.00
Tripp	183S	19	3	1.00
Tripp	183N	43	4	1.00
Tripp	183N	61	5	1.00
Tripp	49	18	6	1.00
Tripp	49	27	7	1.00
Tripp	49	42	8	1.00
Tripp	18	242	9	1.00
Tripp	18	252	10	1.00
Tripp	18	252	11	1.00
Tripp	18	273	12	1.00
Tripp	44	237	13	1.00
Tripp	44	270	14	1.00
Kingsbury	25	114	1	1.00
Kingsbury	25	120	2	1.00
Kingsbury	81	116	3	1.00
Kingsbury	81	119	4	1.00
Kingsbury	81	125	5	1.00
Kingsbury	14	363	6	1.00
Kingsbury	14	365	7	1.00
Kingsbury	14	378	8	1.00
Kingsbury	14	378	9	1.00
Kingsbury	14	383	10	1.00
Kingsbury	14	387	11	1.00
Kingsbury	14	390	12	1.00
Kingsbury	14	400	13	1.00
Kingsbury	25	113	14	1.00

APPENDIX B: OBSERVER INSTRUCTIONS FOR COMPLETING THE SEATBELT / MOTORCYCLE HELMET USE SURVEY FORM

OBSERVER MANUAL FOR COMPLETING THE SEATBELT / MOTORCYCLE HELMET USE SURVEY FORM

South Dakota Statewide Seatbelt and Motorcycle Helmet Use Surveys

June, 2011

OVERVIEW

The South Dakota Seatbelt and Motorcycle Helmet Use Survey Form has been designed so that a large amount of information can be quickly collected about seatbelt and motorcycle helmet use on our state roads. The form allows for collection of seatbelt use data for all drivers and right front passengers in non-commercial vehicles, as well as children age four and under **anywhere** in the car. Since 2009, the form also allows for collection of helmet use data for motorcycle drivers and passengers. The form is constructed so that every person to be surveyed in or on a vehicle (including motorcycles) receives one full line of data -- 22 columns across the page.

The first three columns are used to record an identification number given to the occupant's vehicle, starting with 001 for the observation period. The type of vehicle is recorded in the fourth column. In the fifth column, the occupant is recorded as being a driver, a right front seat passenger, an additional child 0-4 years in the front, a child 0-4 years in the back seat, a motorcycle driver, or a motorcycle passenger of any age. **The occupant's seatbelt, child restraint use, or helmet use is recorded in the sixth column – the most important information for the survey!** In the 7th column, the occupant's age is estimated. In the 8th column, the occupant's vehicle is recorded as having either an in-state or out-of-state license plate.

The remaining 14 columns are used for recording "demographic" information about the observation such as county, site number, time of day, and road type. While the vehicle and occupant information must be recorded immediately as the vehicle passes, the demographic information only has to be written **once** on the first line of the first coding form used for a 40-minute observation period. When the coding sheets are processed, the demographic information will be automatically duplicated for all persons recorded during that observation session.

Here are some common mistakes made in past surveys:

- **Remember to start with Vehicle ID Number "001" for every new 40 minute observation period. In the past, some Observers incorrectly started with the last number from the previous survey period. For example, if they ended up with 45 vehicles during the first period, they started with number "046" for the second**

period and continued upwards for every new period. This is wrong.

- Since 2009, remember that motorcycles are recorded as Vehicle Type 5. For motorcycles, the Driver code is 5 and the passenger code is 6. A motorcycle rider wearing a helmet is coded 4 and a rider without a helmet is coded 5.
- Remember to give an “extra” child passenger (0 – 4 years of age) who is sitting or standing in the middle of the front seat or on the lap of any person in the front seat the *Driver/Passenger/Extra code of “3”*. Give any child 0 – 4 years in the back seat the *Driver/Passenger/Extra code of “4”*.
- Remember that we are only interested in “extra” child passengers (those described above) who appear to be less than 5 years old. If an “extra” child appears older than four, don’t record any data for this child.
- In past surveys, some vehicles were assigned two drivers – code “1”. We are not sure if the Observers coded a passenger as “1” instead of “2”, or if there were two vehicles with different drivers who were accidentally assigned the same vehicle ID number. Please check your work to correct for this.
- Remember to use the Road Type code number for a site that appears in the description in the site list. These are the correct codes according to definitions used by the Department of Transportation. Even though a highway runs through an intersection in town, it is still considered a “rural highway” if the town has less than 5,000 people.
- Do not “double sample” any site by having two Observers recording data on two different streams of vehicles at or near the same site. It is acceptable for Observers to share recording duties or to take turns recording data on one stream of vehicles during a 40-minute period. But, do not split up and watch two streams of vehicles that are going different directions or are at slightly different locations at the same site.
- Remember to stop observing vehicles at the end of the 40 minute period, no matter if you have 0 vehicles or over a 100!

1) Materials

Observers will be observing from 13 - 17 sites for 40 minutes each over a period of 4 days (officially Thursday – Sunday.) They will be mailed a packet of materials containing all necessary materials for these observations. Observers will receive an Observer Site Schedule that will show the time and place to observe traffic over the 4-day period. Some extra days are listed as alternative dates. Observers will receive an Observation Site List that contains the numbers and descriptions of the observation sites located along urban and rural highways and interstates. Maps of the approximate location of the observation sites will also be provided.

2) Preparation for the Observation Session:

Observers should wear an orange safety vest issued by the SD Office of Highway Safety to increase their visibility to passing traffic. Observers should carry their observation sheets on a clipboard and use a number 2 pencil for recording information. Do not use ink or flair pens. It is very important that Observers write numbers clearly so that they can be entered correctly into the computer. Cross "7"s so that they can be distinguished from "1"s.

3) Arrival on Site and selection of an Observation Area:

Observers should reach their observation site a few minutes before they plan to begin the observation session. Note that scheduled time periods are 1½ hour periods and the observation session is only for 40 minutes. This gives Observers some leeway in start and stop times. Make sure you allow enough time to finish and get to the next site.

Before the observation session begins, the Observer should record the demographic information in columns 9 - 22 on the first row of the observation sheet. Most of the codes for the demographic information are on the top of the observation form. Information about "Road Type" is on the Site List. This information only has to be coded once for each 40-minute observation session.

Observers will then choose a position at the site that provides the best view of occupants in vehicles. For urban road sites, choose sites that allow observation of vehicles that have stopped for a red light or stop sign, or slowed for a yield sign. The best position is usually on the curb next to a right-hand turn lane on urban sites. For rural segments, intersections or junctions provide the best observation position.

Observers should stand at the safest possible position, either on the curb or well to the side of the road which allows them a good view inside the front seat of cars/vans/trucks and sport utility vehicles which will be stopping or slowing at the site. Observers must be careful not to step into the roadway and endanger themselves as they attempt to look inside passing vehicles. It is better to be safe and guess about some information than it is to put oneself at risk for a closer look. Do not observe in weather with lightning.

4) Selection and Coding of the First Vehicle:

When the Observer is ready to record data, he/she will observe the first non-commercial car, mini-van, van, SUV, pickup truck, or motorcycle to stop at the site. **IMPORTANT: Commercial vehicles of any type (cars, station wagons, mini-vans, vans, pickup trucks, and large trucks) will not be included in the survey.** Commercial vehicles are those with commercial license plates and/or commercial signing or lettering of any kind on the vehicle. **Four-wheel or three-wheel ATVs are also not included in the survey. They do not count as motorcycles!**

The first vehicle is assigned the sequence number "001" and marked as a car, van/mini-van/station wagon, SUV, pickup truck or motorcycle. Next, the person driving the vehicle is

marked for being in the driver position. Then the driver's seatbelt or motorcycle helmet use and age group is recorded, followed by a code for in-state or out-of-state vehicle license plate.

If there is a right front vehicle passenger or a motorcycle passenger, use the next line of the form to code passenger information. This line also begins with the ID number of "001". If there is a child 0-4 years of age in addition to the right seat passenger, (e.g., one who is sitting or standing on any person's lap or in the center of the front seat, record information about the child on the next line starting with the same vehicle number "001". If there are any children 0-4 years in the back seat, code information about each child on a separate line starting with the same vehicle number.

Observers may not always be able to record accurately all information about the vehicle. The best strategy is to record the most important information first: **drive/pass, seatbelt or helmet use and age**. Then, move to other categories such as vehicle type (car, van, SUV, pickup, motorcycle). Record the state of license plate last, skipping it if you must.

5) Selection of Vehicles Throughout the Observation Session:

If traffic flow is **heavy** (an average of more than one vehicle per minute including motorcycles), observe **every other** vehicle (including motorcycles) that stops or slows down. For example, after the first vehicle has been coded as Vehicle ID "001", the Observer should let one vehicle stop and leave and then code data on the **next** vehicle that stops as Vehicle ID Number "002". Repeat the pattern throughout the 40-minute period.

If the traffic flow is lighter such that less than one vehicle stops every minute, Observers should record data on **every vehicle** (including motorcycles) that stops or slows down. If a vehicle containing several children takes a lot of time to code, skip the next one or two vehicles until you are ready to code again.

6) Completing the Observation Session:

At the end of the 40-minute observation session, Observers should go to the box in the lower right corner of the first survey form used for the session and check whether every vehicle or every other vehicle was observed. Then, Observers should record the total number of vehicles observed for the session. **Note that the total number should match the highest Vehicle ID Number for the session - be careful not to count vehicles with passengers more than once.** Scan handwriting and correct unreadable numbers. The survey forms should be clipped together in correct order, and stored in a safe, dry place until they are mailed back to Cindy Struckman-Johnson.

7) Starting the Next Observation Session:

At the Observer's next 40-minute session, he/she should begin with a **new survey form** and the **Vehicle ID numbers should begin again with "001"**. Demographic information for this site should be recorded on the first line of the coding sheet.

DESCRIPTIONS OF CATEGORIES AND CODES

Vehicle ID Number

During each observation session, the Observer will assign a sequential "Vehicle ID number" to each vehicle that is selected for observation. Sequential means that the next vehicle gets the next higher number. The sequential ID's should start with "001" each session. ID numbers for an observation session in heavy traffic will probably run from 001 to over 100. **The same Vehicle ID Number is assigned to the driver and passengers in the same vehicle.** In other words, if a vehicle has only a driver, only one line of the coding form will be used for the vehicle. If the vehicle has a driver and passengers, **two or more** lines of the coding form will be used for the vehicle and **all will have the same Vehicle ID Number.**

Vehicle Type

Non-commercial passenger cars are coded as "1". Vans, mini-vans, and station wagons are coded as "2". Sport utility vehicles of all types are coded as "3". Pickup trucks are coded as "4". Two wheeled motor vehicles of any type (motorcycles, scooters, mopeds, or three wheelers) are recorded as "5". Motorcycles with sidecars and three wheeled tricycle type motorcycles should also be recorded as motorcycles. **Four- or three-wheel ATV's should not be counted as motorcycles.**

Driver/Passenger/Extra Children Age 0-4

Drivers of standard motor vehicles (car, van, minivan, sport utility, or pickup) are coded as "1". Standard motor vehicle passengers of any age, child or adult, in the right front seat are recorded as "2". **IMPORTANT: Extra children (0-4 years) in the front seat who are sitting or standing on a person's lap or in the middle of the seat are recorded as "3". Children (0-4 years) anywhere in the back seat are recorded as "4".**

Drivers of motorcycles (two or three wheeled) are coded as "5". All passengers on motorcycles are coded "6" regardless of age.

To clarify, driver-passenger codes "1" through "4" are used for standard motor vehicles. Codes "5" and "6" are used only for motorcycles.

Seatbelt /Helmet Use ** The Most Important Part of the Survey! **

Cars, Vans, SUVs and Pickups

As soon as a standard motor vehicle stops or slows, observers should immediately determine whether the driver and right front passenger or any children 0–4 years of age are wearing a safety restraint. A "1" means a seatbelt is being used. A "2" means it was not in use. A "3" is used for the special case when a child passenger is sitting in a child restraint device or car seat.

Seatbelt use is determined by the **shoulder strap of the seatbelt or by the use of a child restraint** for standard motor vehicles. Using a shoulder strap as an indicator is a procedure that the National Highway Traffic Safety Administration has standardized for seatbelt surveys across the country. It has been determined to be more accurate than trying to see inside of cars to check for lap belts.

For the driver of a standard motor vehicle, code "1" if a shoulder strap is in use. Code "2" if the shoulder strap is not in use.

If there is a right front passenger of any age, code "1" if a shoulder strap is in use. Code "3" if a child restraint (car safety seat, infant carrier, special harness to supplement the standard lap/shoulder belt, etc.) is in use. Code "2" if NEITHER the shoulder strap nor a child restraint is in use.

If there is an "extra" child 0-4 years old in the front seat **in addition** to the right front seat passenger, give a Seatbelt Use code of "3" if a child restraint is in use (e. g., a safety seat is placed in the middle of the seat.) Code "1" if the child 0-4 years is restrained by only a shoulder belt, but not a child restraint. Code "2" if NEITHER a child restraint or shoulder belt is in use. Use the same Seatbelt Use codes for children 0-4 years of age in the backseat.

Motorcycles

When a two or three wheeled motorcycle stops, helmet use should be recorded in **column 6 – the same column used for seatbelt use**. For the driver of a motorcycle, code "4" if a helmet is in use. Code "5" if a helmet is not in use. A helmet must actually be worn it be considered in use. A helmet hanging from or sitting on a motorcycle is considered **not** in use. If there are one or more passengers on the motorcycle (including sidecars), record their helmet use in the same way.

To clarify, seatbelt/helmet use codes 1, 2, and 3 are only used for drivers and passengers of standard four wheeled vehicles. Codes 4 and 5 are only used for drivers and passengers on motorcycles.

Age

Observers should pay special attention to judging the age of child occupants / riders.

- If the occupant or rider is an "infant" to 4 years old, code "1".
- If the occupant or rider appears to be 5 to 13 years old, code "2".
- If the occupant or rider appears to be 14 to 17 years old, code "3".
- If the occupant or rider appears to be 18 years old or older, code "4".

If you are uncertain about the exact age of an occupant such as you are not sure if a child is 13 or 14 years old, make your best guess. If you cannot see the occupant well enough to even guess at their age, then code "5" for unknown. The unknown category is used only for cases when you cannot determine age at all, e.g., large hat obscuring face of vehicle occupant or a full face helmet on a motorcycle rider.

License State

This column is used to indicate whether or not the license plate on the observed vehicle is from South Dakota or another state. Code "1" for a South Dakota plate (regardless of county of origin). Code "2" for any out of state plate. Code "3" if you absolutely cannot determine whether or not the plate is in-state or out of state.

THE REMAINING CODES ARE RECORDED ONLY ONCE ON THE FIRST LINE OF THE FIRST FORM USED AT A SITE.

County

Code the appropriate number for the thirteen counties listed on the Observer Form.

Site

Observers will be given an "Observation Site List" which will list all observation sites in the county and a two-digit Site Number for each site. Observers should code the appropriate Site Number for each 40-minute observation session.

Time

The Time category refers to the time of day that the observation session is scheduled.

- 1 = 7:30 to 9:00 A.M.
- 2 = 9:00 to 10:30 A.M.
- 3 = 10:30 to 12 noon
- 4 = 12 noon to 1:30 P.M.
- 5 = 1:30 to 3:00 P.M.
- 6 = 3:00 to 4:30 P.M.

Month/Day/Year

Record the full date of the observation day --including "0"s --in these six spaces. For example, June 5, 2011 would be recorded as "060511".

Observer

Each Observer will enter his or her first and last initial initials on the coding sheet for identification purposes.

Road Type

The Observation Site List provided to all observers will have a "Road Type" code for each site. **REMEMBER TO USE THE ROAD TYPE NUMBER ASSIGNED IN THE SITE LIST. The sites have been assigned the codes of 1 (Urban Highway), 2 (Rural Highway), 3 (Urban Interstate) and 4(Rural Interstate) based on Department of Transportation definitions.**

Returning Data

When you are finished observing all of your sites, put the completed survey forms in the return-addressed envelope in your supplies packet and mail it back to Cindy Struckman-Johnson. Use the enclosed money to send the package PRIORITY rate with a green DELIVERY CONFIRMATION sticker. Cindy will reimburse you if the cash is not enough!

SURVEY 2 OF MOTORCYCLES

This year the second survey of **only motorcycle drivers and passengers** will take place from **Friday, June 24 through Monday, June 27**. The purpose of this survey is to increase the sample size of motorcycles observed in the first survey in early June. In Survey 2, each Observer from the thirteen counties will go out for a total of eight observation hours over the four day weekend using 7:30 am – 4:30 pm time periods. Four of the hours must be on a weekday (Friday or Monday), and four must be on a weekend (Saturday or Sunday). Weather permitting, Observers will follow **the same site and time schedule that they used for last year's Survey 2**. By mid-June, Cindy Struckman-Johnson will mail Observers the materials for Survey 2, including a survey schedule based upon last year's schedule sent in for their county. She will make calls to make sure that all materials are received. After Observers have completed their observations for Survey 2, they are to return the data ASAP in an envelope provided in the second mailing from Cindy.

After the two surveys are completed, please send orange vests and any expense information to your group coordinator, not to Cindy.

APPENDIX A

SEATBELT SURVEY FORM EXAMPLES

The last page of this appendix contains an example of a partially completed survey form. It contains coding for 5 motor vehicles and one motorcycle at a hypothetical observation site in Brown County. What follows is an explanation of why the codes shown on the sample form have been used. These examples have been selected to demonstrate many

of the things you will commonly encounter while observing as well as some things you need to be careful about.

Vehicle 001 – Driver Only

There is only a single line with the vehicle ID 001, so this vehicle did not have a passenger. Note that vehicle 1 is coded "001" not "1". The vehicle type is coded as "1" so this vehicle must have been a non-commercial car. The third thing that is coded is "1" for Drive/Pass/Extra. This line of entries describes a driver. The next column indicates the driver's belt use. Because this is coded as "1", a shoulder belt was in use. Age is coded "4" meaning that the driver is 18 years of age or older. The "1" in the Lic State column means the vehicle plate was from South Dakota.

The remaining columns of information apply to all the vehicles coded on this sheet, so only one line of data needs to be entered for the entire sheet. County is coded "03" because this example takes place in Brown County. The next 2 columns are the code for the particular site within Brown County. Each observer will be provided with a list of codes for all sites at which he/she will be observing. Time is coded as "2" meaning that the observation is taking place between 9:00 and 10:30 A.M. The next six columns code the month, day and year of the observation.

The next two columns are for the first and last initials of the observer. In this example, Donna Smith was observing so "D" and "S" are recorded in these two columns. The last column indicates the type of road on which the observation is taking place. Because the observation site is a highway that runs through a city, the correct road type is urban highway and code "1" is entered. Please do not guess at the road type. Instead, use the road type code that appears on the site list. The definitions of road type were determined by the Department of Transportation.

Vehicle 002 – Driver /Right front passenger (Child 0-4 years)

Vehicle 002 is a car and has two lines of code and a "3" in the Veh Type column indicating an SUV with a driver and passenger. The driver line indicates a shoulder belt was used (Seat belt use code = "1") and that driver was at least 18 years old (Age code = 4). The car has South Dakota plates.

The passenger line for Vehicle 002 indicates that the passenger was a child 0-4 years of age in the right front seat (Drive/Pass/Extra = "2") in a child restraint (Seat belt use = "3"). It is extremely important to the survey that child restraint use be coded correctly. If a passenger is **USING** a child restraint, "3" is the correct code for the Belt use column. Do NOT code "1" (shoulder belt used) even if a shoulder belt is being used to hold the child restraint in place. Finally, do NOT use code "3" if an empty child restraint is present in the front seat. The age is coded as "1" indicating that the passenger was between 0 and 4 years of age. The final column for the Vehicle 002 passenger line repeats the South Dakota license plate code "1".

Vehicle 003 – Driver /Right front passenger/ Extra child 0-4 in front/ Non-recorded older child

Vehicle 003 has three lines of code indicating a driver and more than one passenger. The Veh Type column for vehicle 003 is coded as “2” indicating that the vehicle was a van, mini-van or station wagon. The driver line (code “1” in Drive/Pass/Extra) has an entry for Belt Use indicating that the driver was not wearing a seat belt (code = “2”). Note that the same code value is used to indicate a vehicle occupant is not wearing a shoulder harness or using a child restraint for all standard vehicle types, but not for motorcycle helmet use. The remaining codes for the driver of Vehicle 003 indicate that the driver is 18 years old or older and that the vehicle had out-of-state license plates, coded “2”.

The next line of information for the first passenger of vehicle 003 duplicates the Vehicle ID Number and Veh Type codes. The Drive/Pass column is coded “2” to indicate a right front seat passenger. The Belt Use column is coded “1” indicating that the passenger was wearing a seat belt. The next column of the passenger information records age. Code “5” is entered in this example. Code “5” stands for "Unknown". In this example, the age is unknown because the child on her lap blocked the passenger’s face from view. This is one of the few situations in which code “5” is appropriate. Code “5” should **not** be used in cases when you are not sure whether a person is 4 or 5, 13 or 14, or 17 or 18. If you are not sure about age category, make your best guess. **Use code “5” only in those cases when you can’t tell age at all.** The final column of the first passenger data duplicates the out-of-state license code from the previous line for this vehicle.

The third line of information for vehicle 003 again duplicates the Vehicle ID Number and the Veh Type codes. The Drive/Pass column is coded as “3” indicating that there was a child 0-4 years of age in the front seat in addition to the right front passenger coded on the previous line. (In this case, the child 0-4 years of age had been seated on the right front passengers’ lap.) The Belt Use column is coded as “2” indicating the child was not in a child restraint device. The Age column indicates that the child was 0-4 years of age. The Lic State code duplicates the “2” indicating an out of state license plate as recorded on the previous two lines for Vehicle 003.

A fourth child was present in the center of the seat. However, no information was recorded for this child because the child was estimated to be in the age category of 5-13 years.

Vehicle 004 – Driver /Two backseat passengers (0-4 years)

Vehicle 004 is a car with three lines of code and a “1” in the Veh Type column indicating a car with a driver and at least two passengers. The driver line indicates a shoulder belt was used (code “1”) and that driver was at least 18 years old. The car has South Dakota plates.

The second line for Vehicle 004 indicates that a child 0-4 years of age was seated in the back seat (passenger code 4) in a child restraint (code = “3”). The age is coded as “1”

indicating that the passenger was 0-4 years of age. The final column for the Vehicle 004 passenger line repeats the South Dakota license plate code "1".

The third line for Vehicle 004 indicates that a second child (0-4 years of age) was present in the back seat (Drive/Pass/Extra is coded as "4"). This child 0-4 years old was not in a child restraint as indicated by the Seat Belt Use code "2". Age is coded as "1" and the License plate information is repeated as "1" indicating a vehicle with SD license plates as recorded on the previous two lines.

Vehicle 005 – Driver /Backseat passenger (0-4 years)

Vehicle 005 has two lines of code. A "1" in the Vehicle Type column indicates this was a car. The driver was wearing a seat belt (Seat belt use code = "1") and was between 14 and 17 years of age (Age code = "3"). The vehicle had South Dakota license plates.

The second line of code for Vehicle 005 repeats the vehicle type information. The Drive/Pass/Extra code of "4" indicates that there was a child 0-4 years of age in the back seat. The Seat belt use code is "1" for this passenger indicating that the child 0-4 years was wearing a shoulder belt but was not in a child restraint device.

Vehicle 006 – Motorcycle driver and passenger

Vehicle 006 has two lines of code. A vehicle type "5" indicates a motorcycle. The first line corresponds to the motorcycle driver as indicated by the "5" coded in the Drive/Pass or Extra column. A "5" is coded in the next column indicating no helmet use. The driver's age is estimated to be over 18 as indicated by the "4" coded in the next column. The vehicle has an SD plate.

The second line of code for vehicle 006 repeats the vehicle information. A "6" is coded in the next column to indicate a motorcycle passenger. A "4" indicates that the passenger was using a helmet and the 2 in the next column indicates that the passenger was between 5 and 13. This estimation was possible because the helmet used did not obscure the passenger's face. With full face helmet use, the age category may have to be coded as "5" – unknown.

Observation Session Summary Boxes

The observation session summary box in the lower right hand corner of the sample form would be completed if this were the **first** page of information collected at a site. Because this example starts with Vehicle ID Number 001, this is a first sheet.

The upper half of the box indicates whether every vehicle was observed (normal traffic conditions) or every other vehicle was observed (heavy traffic conditions). The "Every Car Observed" line is checked because traffic was light for this sample!

A lower box indicates the total number of vehicles including motorcycles observed during the 40-minute observation session. There were a total of 6 vehicles. At the end of an

observation session, you will need to count vehicles on ALL forms used during that session, but **you should only enter the totals on the first sheet.**

The lowest box is used for recording a description of the actual location used for observation. For this example, the Observer was located at the interchange of Highway 281 and Highway 12 observing all traffic turning onto Highway 281.

Remember: Use a number 2 pencil so that you may erase and clarify coding information written unclearly when the observation period is over.

If you have any questions about this manual or any of the survey procedures, call Cindy Struckman-Johnson in the Human Factors Lab at the University of South Dakota at (605) 677-5295 or (605) 677-5098 in the afternoon or 605-624-8858 in the mornings and evenings. Her cell phone number is 605-670-2657. If Cindy is not available, please leave a message with a number and a good time to call you and she will return your call. Cindy's e-mail is cindysj@usd.edu.

STAY SAFE AND GOOD LUCK!

Vehicle Type
 Car = 1
 Van, Minivan, or
 Station Wagon = 2
 Sport Utility = 3
 Pickup = 4
 Motorcycle = 5

Seatbelt/Helmet Use
 Seatbelt Used = 1
 Seatbelt Not Used = 2
 Child Restraint Used = 3
 Helmet Used = 4
 Helmet Not Used = 5

License State
 South Dakota = 1
 Other State = 2
 Unknown = 3

County
 Minnehaha = 01
 Pennington = 02
 Brown = 03
 Lawrence = 04
 Davison = 05
 Beadle = 06
 Hughes = 07
 Union = 08
 Charles Mix = 09
 Grant = 10
 Fall River = 11
 Tripp = 12
 Kingsbury = 13

Site Number
 Check County
 Site List

Time
 7:30 – 9:00 am = 1
 9:00 – 10:30 am = 2
 10:30 – noon = 3
 noon – 1:30 pm = 4
 1:30 – 3:00 pm = 5
 3:00 – 4:30 pm = 6

Road Type
 Urban Highway = 1
 Rural Highway = 2
 Urban Interstate = 3
 Rural Interstate = 4
 (Check County Site
 List)

Driver / Passenger/Extra
 Driver = 1
 Right Front Passenger = 2
 Extra Child Front = 3
 Child Rear = 4
 Motorcycle driver = 5
 Motorcycle passenger = 6

Age
 Infant to 4 = 1
 5 to 13 = 2
 14 to 17 = 3
 18 or over = 4
 Unknown = 5

Revised May 2009

Vehicle ID Number	Veh Type	Drive Pass or Extra	Seat Belt/Helm Use	Age	Lic State	County	Site Number	Time	Month	Day	Year	Observer	Road Type
0 0 1	1	1	1	4	1	0 3	0 3	2	06	7	09 59	10 09	D. S. 1
0 0 2	3	1	1	4	1								
0 0 2	3	2	3	1	1								
0 0 3	2	1	2	4	2								
0 0 3	2	2	1	5	2								
0 0 3	2	3	2	1	2								
0 0 4	1	1	1	4	1								
0 0 4	1	4	3	1	1								
0 0 4	1	4	2	1	1								
0 0 5	1	11	1	3	1								
0 0 5	1	4	1	1	1								
0 0 6	5	5	5	4	1								
0 0 6	5	6	4	2	1								

Check One

- Every vehicle observed
- Every other vehicle observed

Total vehicles observed in 40 minutes 6

Describe your observing location at this site:

Intersection of 281 & 12. Stood on North corner by the Stop sign - watched traffic turning onto 281

Appendix C

Supplemental Survey Instructions

IMPORTANT: THERE WILL BE A SECOND MOTORCYCLE-ONLY SURVEY ON JUNE 24!

THIS WILL BE THE LAST YEAR OF THE CINDY S-J SEATBELT SURVEY. HOWEVER, YOU MAY BE ASKED TO BE AN OBSERVER AGAIN NEXT YEAR FOR A NEW SURVEY.

MAY 20, 2011

Dear Observers:

Enclosed are all the materials you will need to conduct for the first part of the 2011 South Dakota Seatbelt and Motorcycle Helmet Use Survey:

1. An Observer Manual with instructions on how to observe traffic;
2. Survey coding forms for Survey 1 and **extras for the new Survey 2**;
3. An Observer Schedule showing the day and time for site observations (2 copies);
4. A Site List & maps that describe the location of the observation sites in your county (2 copies);
5. A priority mail envelope, a green delivery confirmation sticker, and \$6 for returning the completed survey to Cindy S-J.

The official seatbelt-motorcycle survey will take place from Thursday, June 2, through Sunday, June 5. The “Make Up” time period is Thursday, June 9, through Sunday, June 12. If you trade days, make sure that you end up with observation hours on two weekday days and two weekend days in order to meet federal requirements. If you make a change, please write it on the schedule sheet and return it to us.

The procedures for this survey are the same as in the 2010 survey. You will be collecting data on motorcycles, as well as the usual cars and pickup trucks. As you did last year, you will give motorcycles a vehicle type of “5”. For driver/passenger, motorcycle drivers get a “5” and motorcycle passengers get a “6”. For the seatbelt/helmet use column, motorcycle riders with helmets on get a “4” and those without helmets get a “5”.

I will make individual calls to check in with Observers on Tuesday, May 31, and Wednesday, June 1.

When you are done, please return the data to me **ASAP!** We are on a tight deadline to get the results to the Office of Highway Safety and the Feds. Organize the data by site number (e.g., site 1 – 17), place it in the enclosed priority mail package, have the Post Office put on the delivery confirmation sticker, and use the \$6 for payment. The cost for priority mail is \$4.95 and the confirmation sticker is \$.70 so the price should be \$5.65. Keep the change! Send expense sheets back to your group organizer.

The Motorcycle-Only Survey 2 last year was a success so we will repeat it this summer. Survey 2 is set for Friday, June 24 through Monday, June 27. Weather permitting, you will be going out to the same eight sites at the same time periods as you did last year. I will reconstruct your schedule from last year and send you a new schedule along with other materials around mid-June.

If you ever have questions, call me mid-morning, afternoon, or evening at my home phone (605-624-8858) or on my cell phone (605-670-2657). You can also call Dave Struckman-Johnson at 605-670-1369. My e-mail is cindysj@usd.edu.

If the police or highway patrol ask you what you are doing, show them this letter and advise them to call the director of Office of Highway Safety, **Mr. Lee Axdahl at 605-773- 4949.**

Many thanks for agreeing to do the surveys one more time. This will be the last year of the seatbelt and motorcycle helmet use survey as we know it. The Feds have asked for new sites and new procedures for next year. Hopefully, South Dakota will continue on with the new survey and you may once again be asked to serve as Observers. Our reports in the past have been highly praised because of the expertise and reliability of you Observers!

Sincerely,

Cindy Struckman-Johnson
Project Co-Investigator
Psychology Department
University of South Dakota

Appendix D

Computation of Mean Seat Belt Use for South Dakota

The computation of the mean seatbelt use for in South Dakota was a three-stage process. Stage 1 consisted of computing mean seat belt use for each road type in each county. For purposes of this calculation, only drivers and right front seat passengers were considered to retain compatibility to prior year values and Federal reporting requirements. In this computation, the vehicle miles traveled value (VMT) for a particular site was computed by averaging the VMT values for each of the sub-segments in the road segment the selected site represented. These VMT values were then used to compute a weighted average for all sites for a particular road type in a particular county. This weighted mean seatbelt use rate for a particular road type in a particular county is designated

\hat{P}_{ij} where i denotes road type (from 1 to 4) and j denotes county (from 1 to 13).

The second stage of the computation consisted of computing weighted means for each road type across counties based on the vehicle miles traveled (VMT) on that road type in each county and on the sampling weight for the county based on probability of selection for surveying for that county. The mean seatbelt use for a road type is

$$\hat{P}_i = \frac{\sum_{j=1}^{13} W_{.j} V_{ij} \hat{P}_{ij}}{\sum_{j=1}^{13} W_{.j} V_{ij}}$$

Where \hat{P}_i = the seat belt use estimate for road type i

$W_{.j}$ is the county weight for county j (1 for Minnehaha and Pennington, 31/11 for the remaining 11 counties)

V_{ij} is the VMT for road type i in county j

\hat{P}_{ij} is the seatbelt use rate estimated for road type i and county j in stage 1.

The final stage of the estimate consisted of computing the weighted average of the across county road type estimates for a statewide estimate. Weights were based on the proportion of the state's VMT on each road type.

The formula for computing the statewide estimate is

$$\hat{P} = \frac{\sum_{i=1}^4 V_i \hat{P}_i}{\sum_{i=1}^4 V_i}$$

Where \hat{P} = the statewide seat belt use estimate

V_i is the proportion of VMT for road type i in the state

\hat{P}_i is the rate estimated for road type i in the state stage 2.

In the 2011 South Dakota Survey, the following values were obtained

Urban Highway:	$w_1 = 0.18324$	$\hat{P}_1 = 67.08$
Rural Highway:	$w_2 = 0.44819$	$\hat{P}_2 = 67.14$
Urban interstate:	$w_3 = 0.05521$	$\hat{P}_3 = 73.68$
Rural interstate:	$w_4 = 0.31336$	$\hat{P}_4 = 85.83$

Thus, statewide seat belt use is estimated as 73.35% for 2011.

Computation of Variance and Confidence Bounds for Mean Seat Belt Use for South Dakota

Computational formula for the variance of \hat{P} , using the terms as defined in the computation of the weighted use estimate above, is

$$\text{Var}(\hat{P}) = \frac{\sum_{i=1}^4 \sum_{j=1}^{13} (W'_{ij})^2 * (\hat{P}_{ij} - \hat{P})^2}{n^* - 1}$$

where n^* = the number of county-road type groups

The W'_{ij} in the formula are weights applied to the deviations based on the formula below

$$W'_{ij} = \frac{W_{.j} * V_{ij}}{\sum_{i=1}^4 \sum_{j=1}^{13} W_{.j} W_{ij}}$$

where the W 's and V in the formula are as define previously in discussion of the second stage of the analysis.

Using these formulas, the variance of \hat{P} is 0.2550. The sampling error is then 0.5049.

Now, the 95% confidence bounds can be computed as the:

$$(\text{statewide mean}) \pm (1.96)(0.5049).$$

Thus, the 95% confidence bounds on our mean estimate are:

$$73.35\% \pm (1.96)(0.5049) \text{ or } p(72.36\% < \text{Statewide Use} < 74.34) = .95$$

In non-statistical terms, there is a 95% chance that the true statewide seatbelt use rate in South Dakota is between 72.36% and 74.34% with our best estimate being that it is 73.35%.

Appendix E

Computation of Mean Helmet Use for South Dakota

The computation of the mean helmet use for in South Dakota was a three-stage process. Stage 1 consisted of computing mean helmet use for each road type in each county. In this computation, the vehicle miles traveled value (VMT) for a particular site was computed by averaging the VMT values for each of the sub-segments in the road segment the selected site represented. These VMT values were then used to compute a weighted average for all sites for a particular road type in a particular county. This weighted mean helmet use rate for a particular road type in a particular county is designated

\hat{P}_{ij} where i denotes road type (from 1 to 4) and j denotes county (from 1 to 13).

The second stage of the computation consisted of computing weighted means for each road type across counties based on the vehicle miles traveled (VMT) on that road type in each county and on the sampling weight for the county based on probability of selection for surveying for that county. The mean helmet use for a road type is

$$\hat{P}_i = \frac{\sum_{j=1}^{13} W_{.j} V_{ij} \hat{P}_{ij}}{\sum_{j=1}^{13} W_{.j} V_{ij}}$$

Where \hat{P}_i = the helmet use estimate for road type i

$W_{.j}$ is the county weight for county j (1 for Minnehaha and Pennington, 31/11 for the remaining 11 counties)

V_{ij} is the VMT for road type i in county j

\hat{P}_{ij} is the helmet use rate estimated for road type i and county j in stage 1.

The final stage of the estimate consisted of computing the weighted average of the across county road type estimates for a statewide estimate. Weights were based on the proportion of the state's VMT on each road type.

The formula for computing the statewide estimate is

$$\hat{P} = \frac{\sum_{i=1}^4 V_i \hat{P}_i}{\sum_{i=1}^4 V_i}$$

Where \hat{P} = the statewide helmet use estimate

V_i is the proportion of VMT for road type i in the state

\hat{P}_i is the rate estimated for road type i in the state stage 2.

In the 2011 South Dakota Survey, the following values were obtained

Urban Highway:	$w_1 = 0.18324$	$\hat{P}_1 = 41.54$
Rural Highway:	$w_2 = 0.44819$	$\hat{P}_2 = 45.64$
Urban interstate:	$w_3 = 0.05521$	$\hat{P}_3 = 37.88$
Rural interstate:	$w_4 = 0.31336$	$\hat{P}_4 = 65.87$

Thus, statewide helmet use is estimated as 50.80% for 2011.

Computation of Variance and Confidence Bounds for Mean Helmet Use for South Dakota - 2011

Computational formula for the variance of \hat{P} , using the terms as defined in the computation of the weighted use estimate above, is

$$Var(\hat{P}) = \frac{\sum_{i=1}^4 \sum_{j=1}^{13} (W'_{ij})^2 * (\hat{P}_{ij} - \hat{P})^2}{n^* - 1}$$

where n^* = the number of county-road type groups

The W'_{ij} in the formula are weights applied to the deviations based on the formula below

$$W'_{ij} = \frac{W_{.j} * V_{ij}}{\sum_{i=1}^4 \sum_{j=1}^{13} W_{.j} W_{ij}}$$

where the W 's and V in the formula are as define previously in discussion of the second stage of the analysis.

Using these formulas, the variance of \hat{P} is 0.57768. The sampling error is then 0.760111.

Now, the 95% confidence bounds can be computed as the:

$$(\text{statewide mean}) \pm (1.96)(0.760111).$$

Thus, the 95% confidence bounds on our mean estimate are:

$$50.8\% \pm (1.96)(0.760111) \text{ or } p(49.31\% < \text{Statewide Use} < 52.29) = .95$$

In non-statistical terms, there is a 95% chance that the true statewide helmet use rate in South Dakota is between 49.31% and 52.29% with our best estimate being that it is 50.80%