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Occupant Restraint Use In 2016:

Results From the NOPUS Controlled Intersection Study

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Abstract

This report presents results from the 2016 National Occupant Protection Use Survey (NOPUS) Controlled Intersection Study, the only nationwide probability-based occupant restraint use survey. NHTSA's National Center for Statistics and Analysis conducts this survey annually. The 2016 NOPUS found that seat belt use continued to be higher for females (92.5%) than for males (88.2%). Seat belt use among female drivers increased from 90.7 percent in 2015 to 92.5 percent in 2016. Seat belt use in the rear seat (80.6%) was lower than in the front seat (90.1%).

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Definitions

- Vehicle occupants observed in the NOPUS survey are counted as "belted" if they appear to have a shoulder belt across the front of the body. NOPUS does not observe the use of lap belts because these restraints cannot be reliably observed from the roadside.

- The survey classifies a child as:
  - Restrained in a rear-facing car seat if the child appears to be on a seat on top of the vehicle seat, facing the rear of the vehicle, with harness straps across the front of the child.
  - Restrained in a forward-facing car seat if the child appears to be on a seat on top of the vehicle seat, facing the front of the vehicle, with harness straps across the front of the child.
  - Restrained in a high-backed booster seat if the child appears to be on a seat on top of the vehicle seat with a shoulder belt across the front of the child.
  - Restrained in a seat belt or backless booster seat if there is a shoulder belt across the front of the child but the observers cannot see if the child is in a seat on top of the vehicle seat.
  - Restrained if s/he is restrained by any of the above.
  - The remaining children are classified as unrestrained. Note that in the survey there is no mention of being "unrestrained" in, for example, a forward-facing car seat. NOPUS does not observe the use of lap belts, and does not distinguish between seat belts and backless booster seats, because these assessments cannot be reliable if observed from the roadside.

- The racial categories "Black," "White," and "Members of other races" in NOPUS reflect subjective characterizations by roadside observers regarding the race of vehicle occupants. Likewise observers record all age groups (8 to 15 years old, 16 to 24 years old, 25 to 69 years old, and 70 and older) that best fits their visual assessment of each observed occupant.

- "Expressways" are defined as roadways with limited access, while "surface streets" comprise all other roadways.

- A roadway is defined to have "fast traffic" if, during the observation period, the average speed of passenger vehicles passing the observers exceeds 50 mph, with "medium-speed traffic" defined as 31 to 50 mph and "slow traffic" defined as 30 mph or slower. The traffic speed data in the CI survey is matched to the MT survey data.

- A roadway is defined to have "heavy traffic" if the average number of vehicles on the roadway during the observation period is greater than 5 per lane per mile, with "moderately dense traffic" defined as greater than 1 but less than or equal to 5 vehicles per lane per mile, and "light traffic" as less than or equal to 1 vehicle per lane per mile. Please note that this traffic density breakdown has been revised in the 2011 NOPUS to better capture the traffic patterns. The traffic density data in the Control Intersection (CI) survey is matched to the Moving Traffic (MT) survey data.

- Since NOPUS is not a census but based on a probability sample, it is impossible to produce State-by-State restraint use results. However NOPUS can and does produce regional estimates using the following categories:

Northeast: Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont

Midwest: Iowa, Kansas, Illinois, Indiana, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, Wisconsin

South : Alabama, Arkansas, the District of Columbia, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia

West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Washington, Washington, Wyoming

These definitions of the four NOPUS regions are the same regional definitions used in the National Survey of the Use of Booster Seats (NSUBS).

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The National Occupant Protection Use Survey is the only nationwide probability-based survey of seat belt use (for occupants 8 and older in both front and rear seats), motorcycle helmet use, child restraint use (for children under 8 years old), and driver electronic device use in the United States. NHTSA's National Center for Statistics and Analysis conducts this survey annually. Two sub-surveys – the Moving Traffic (MT) Survey and the Controlled Intersection (CI) Study –comprise the NOPUS.

In the Controlled Intersection Study, occupants of passenger vehicles are observed from the roadside at intersections controlled by stop signs or stoplights. Only stopped vehicles are observed to allow ample time to collect a variety of information required by the survey. NOPUS derives its estimates of seat belt use in rear seats, child restraint use, driver electronic device use, and demographic characteristics of vehicle occupants from the CI study.

In 2015, NOPUS was redesigned. The original NOPUS was designed in 1994 and updated in 2006. The data used for previous designs was outdated and needed to be brought up to date. Additionally, conducting the study through several cycles has provided valuable knowledge on needed improvements. Please consult Section 5 "NOPUS Methodology" for details about the redesign.

This report presents results of occupant restraint use from the 2016 NOPUS Controlled Intersection Study. NHTSA will publish the driver electronic device use results in a separate research note. The following are some of the major findings from the 2016 NOPUS Controlled Intersection Study:

Front Seat Belt Use (Among Occupants 8 and Older):

- Seat belt use increased significantly from 88.5 percent in 2015 to 90.1 percent in 2016.
- Seat belt use continued to be lower for males (88.2%) than females (92.5%) in 2016. Seat belt use among female drivers incrased significantly from 90.7 percent in 2015 to 92.5 percent in 2016.
- Seat belt use continued to be lower among 16- to 24-year-olds (86.6%) than other age groups. However, seat belt use among 25- to 69-year-olds increased significantly from 88.6 percent in 2015 to 90.4 percent in 2016.
- Seat belt use among drivers driving with at least one passenger increased significantly from 90.4 percent in 2015 to 92.8 percent in 2016.
- Seat belt use among drivers driving with passengers all under age 8 increased significantly from 89.6 percent in 2015 to 94.0 percent in 2016.

Rear Seats Belt Use (Among Occupants 8 and Older):

- Seat belt use continued to be lower in the rear seat (80.6%) than in the front seat (90.1%) in 2016.

- Rear seat belt use increased to 80.6 percent in 2016 from 74.8 percent in 2015. Rear seat belt use among female occupants increased significantly from 75.5 percent in 2015 to 81.7 percent in 2016.
- Seat belt use among motorists in the rear seats who appear to be black increased significantly from 52.4 percent in 2015 to 71.4 percent in 2016.
- Seat belt use in the rear seat continued to be higher in the States with laws requiring belts to be used in all seating positions (83.9%) than those with laws requiring belts to be used in the front seat only (75.7%) in 2016.

Child Restraint Use (For Children From Birth to 7 Years Old):

- Restraint use for children from birth to 7 years old in 2016 is 90.9 percent, compared to 89.8 percent in 2015.
- Restraint use for children in the west decreased significantly from 97.3 percent in 2015 to 90.7 percent in 2016.
- Restraint use for children in rural areas increased significantly from 86.3 percent in 2015 to 90.4 percent in 2016.

1. Introduction

The National Occupant Protection Use Survey is the only nationwide probability-based survey of seat belt use (for occupants 8 and older in both front and rear seats), motorcycle helmet use, child restraint use (for children under 8 years old), and driver electronic device use in the United States. The NCSA conducts this survey annually. In 2015 NHTSA conducted a redesign to select a new NOPUS sample. For more details, please see Section 5 "NOPUS Methodology." Two sub-surveys: the Moving Traffic Survey and the Controlled Intersection Study comprise the NOPUS.

In the MT survey, front-seat occupant shoulder belt use data and motorcyclist helmet use data are collected either at the roadside or, in the case of expressways, by data collectors in vehicles. NOPUS derives its major estimates of front-seat belt use and motorcycle helmet use from the MT survey. NHTSA published the front-seat belt use results from the 2016 NOPUS MT survey in November 2016.[1]

In contrast, the CI study data is collected at intersections controlled by stop signs or stoplights, where vehicle occupants are observed from the roadside. Only stopped vehicles are observed due to time constraints restricting the amount of time available to collect the variety of information required by the survey. NOPUS derives its estimates of rear-seat belt use, child restraint use, driver electronic device use, and demographic characteristics of the vehicle occupants from the CI study.

Only motorcycles and passenger vehicles (passenger cars, pickup trucks, SUVs, and vans) are observed in the NOPUS. The population of interest includes all 50 States, the District of Columbia, with the sample observation sites consisting of Federal, State, county highways, residential streets, and rural roads. Data is collected only during daylight hours when light is adequate to observe seat belt use through the vehicle windshield.

The 2016 NOPUS data collection was conducted between 7 a.m. and 6 p.m. during the period from June 6, 2016, to June 25, 2016. The 2016 NOPUS survey data is based on the results of 66,993 occupants observed in 48,177 vehicles at 1,600 data collection sites. Of these observed occupants, 2,849 were children under 8. More details on the NOPUS sampling, data collection and estimation are discussed in Section 5: NOPUS Methodology.

Please note that the terms "significant" and "statistically significant" are used interchangeably throughout this report. "Significant" always means "statistically significant," and the statistical significance level is 0.05. In tables below, the data with p-values that are less than 0.05 are formatted in boldface type.

2. Demographic Results

The national seat belt use in 2016 increased to 90.1 percent from 88.5 percent in 2015; a significant increase. This section presents a demographic breakdown of the occupants who used seat belts in 2016. Table 1 on page 5 presents results of passenger vehicle occupant seat belt use by demographic and other characteristics in 2015 and 2016, as well as the changes between the two years. Some major results are highlighted below.

Age

For age group 25 to 69 years old, seat belt use increased significantly from 88.6 percent in 2015 to 90.4 percent in 2016. There was no significant change in seat belt use among occupants for these age groups: 8 to 15 years old, 16 to 24 years old, and 70 and older, from 2015 to 2016. Figure 1 and Table 1 show a comparison of the seat belt use rates between 2015 and 2016 across these age groups.

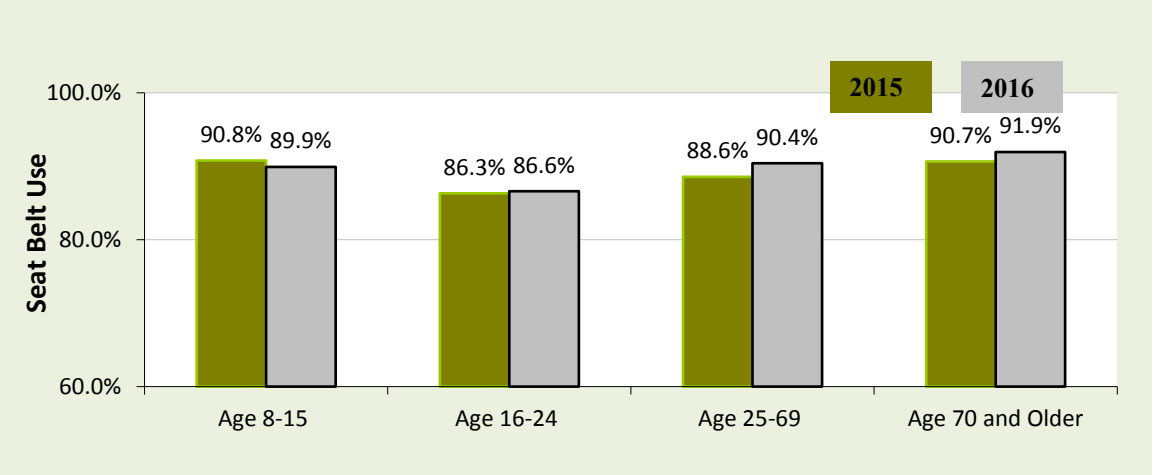

Figure 1: Seat Belt Use by Age for Occupants 8 and Older in 2015 and 2016

Figure 2 displays the trends of seat belt use for the four age groups over a period of 11 years (2006 to 2016). It shows that seat belt use among 16- to 24-year-olds has been consistently lower than other age groups.

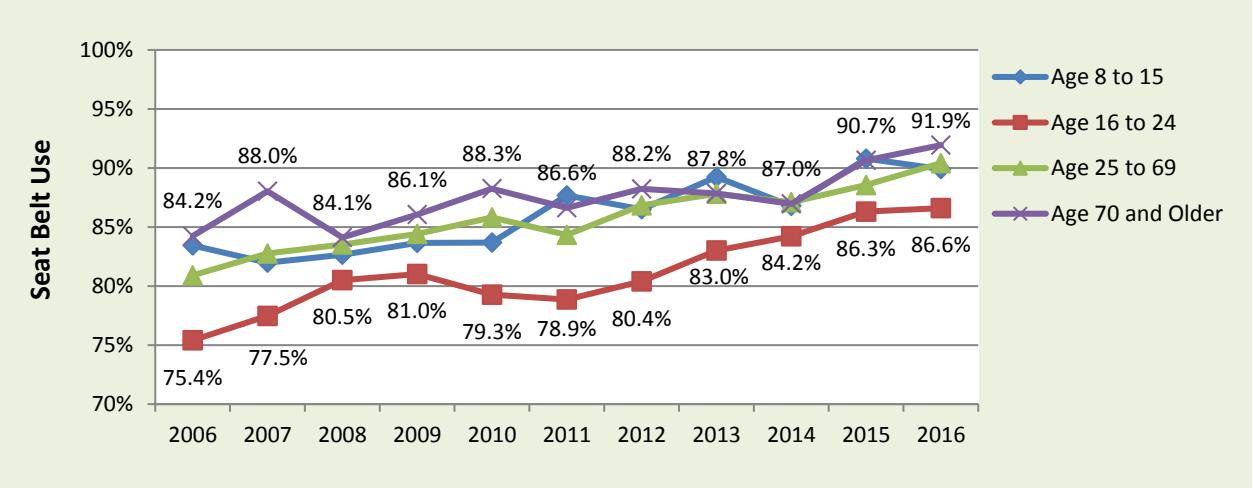

Figure 2: Seat Belt Use by Age for Occupants 8 and Older, 2006-2016

Gender

Figure 3 shows the trends of seat belt use for male and female occupants over a period of 11 years (2006 to 2016). In 2016 seat belt use continued to be lower for males (88.2%) than females (92.5%). Seat belt use by female occupants increased significantly from 90.7 percent in 2015 to 92.5 percent in 2016.

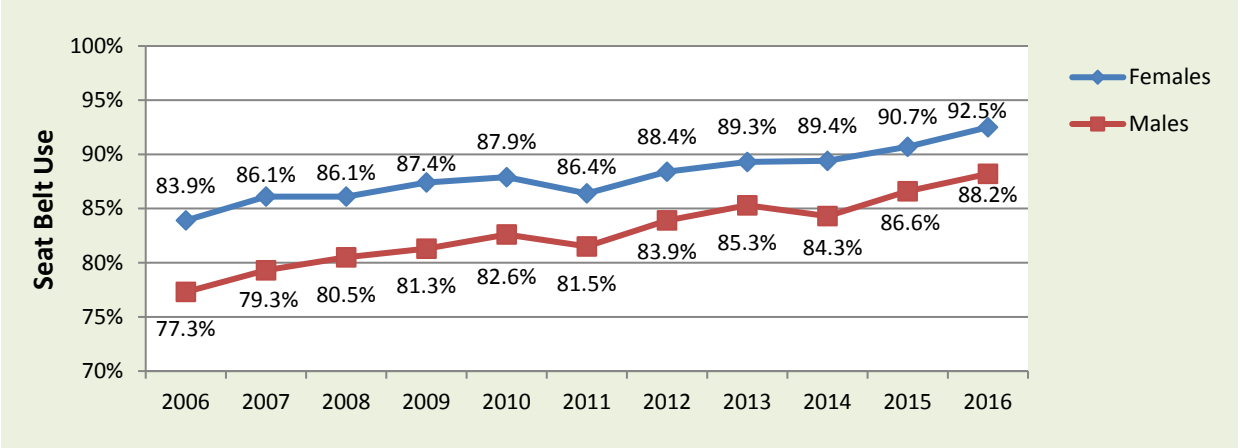

Figure 3: Seat Belt Use by Gender for Occupants 8 and Older, 2006-2016

Race

In NOPUS, observed vehicle occupant race categories are: black, white, and members of other races. This characterization is based on the visual assessment of the data collectors who observe vehicle occupants from roadsides.

Figure 4 shows the trends of seat belt use among occupants who are white, black, and members of other races over a period of 11 years (2006 to 2016). In 2016 seat belt use continued to be lower among black occupants than occupants of the other racial groups. Seat belt use for members of other races continued to be higher than for the other two groups. Seat belt use among white occupants increased significantly from 88.3 percent in 2015 to 90.0 percent in 2016.

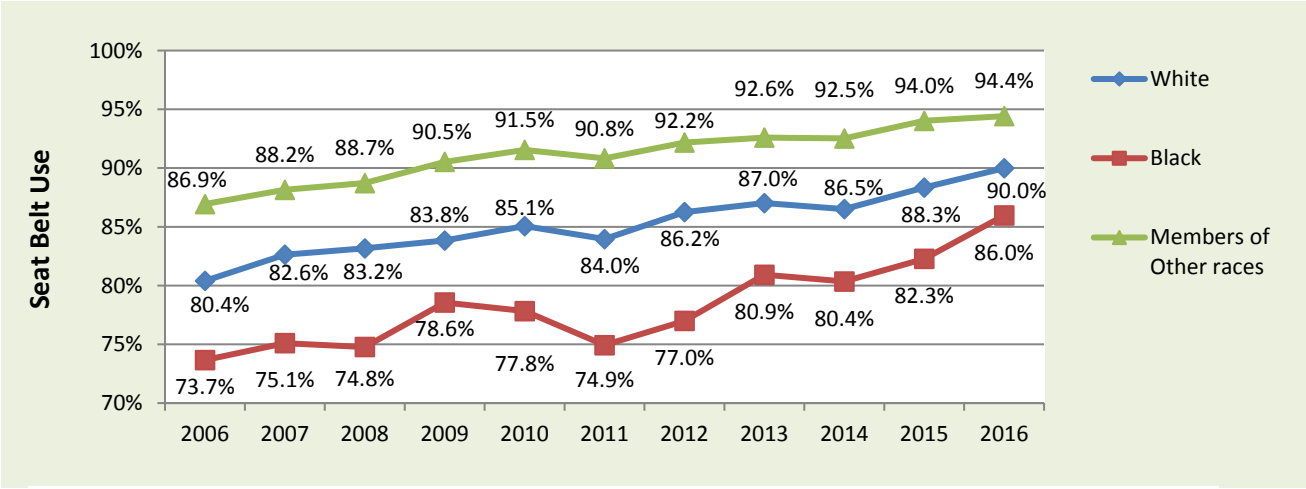

Figure 4: Seat Belt Use by Race for Occupants 8 and Older, 2006-2016

Presence of Passengers and Seat Belt Use

Figure 5 shows that seat belt use continued to be lower for drivers driving alone than for drivers driving with at least one passenger in the vehicle.

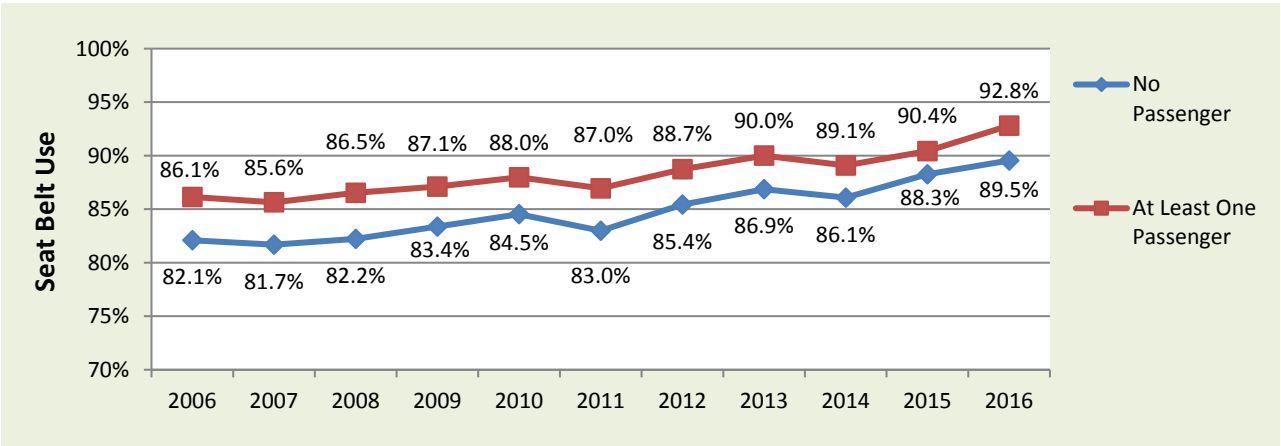

Figure 5: Passenger Effect on Seat Belt Use for Occupants 8 and Older, 2006-2016

As shown in Table 1, seat belt use among drivers driving with at least one passenger increased significantly from 90.4 percent in 2015 to 92.8 percent in 2016. Seat belt use among drivers driving with passengers all under age 8 increased significantly from 89.6 percent in 2015 to 94.0 percent in 2016. Seat belt use among drivers driving with passengers all 8 and older increased significantly from 90.2 percent in 2015 to 92.5 percent in 2016.

Table 1: Passenger Vehicle Occupant Seat Belt Use by Demographic and Other Characteristics

Occupant Group[1]	2015		2016		2015 - 2016 Change		
	Belt Use[2]	95% Confidence Interval[3]	Belt Use[2]	95% Confidence Interval[3]	Change in Percentage	95% Confidence Interval[4]	P-value[5]
All Occupants	**88.5%**	**(86.8, 90.0)**	**90.1%**	**(88.5, 91.5)**	**1.6**	**(0.1, 3.1)**	**0.03**
Males[6]	86.6%	(84.6, 88.4)	88.2%	(86.4, 89.7)	1.5	(-0.0, 3.1)	0.05
Females[6]	**90.7%**	**(89.2, 92.1)**	**92.5%**	**(90.9, 93.9)**	**1.8**	**(0.2, 3.4)**	**0.03**
Occupants by Age Group[6]							
8 to 15	90.8%	(87.9, 93.1)	89.9%	(86.0, 92.8)	-0.9	(-5.3, 3.6)	0.69
16 to 24	86.3%	(83.4, 88.7)	86.6%	(82.1, 90.1)	0.3	(-3.9, 4.5)	0.89
25 to 69	**88.6%**	**(86.8, 90.1)**	**90.4%**	**(88.8, 91.8)**	**1.9**	**(0.3, 3.5)**	**0.02**
70 and Older	90.7%	(88.5, 92.5)	91.9%	(90.3, 93.3)	1.3	(-0.8, 3.3)	0.21
Occupants by Race[6]							
White	**88.3%**	**(86.5, 89.9)**	**90.0%**	**(88.3, 91.5)**	**1.6**	**(0.2, 3.1)**	**0.03**
Black	82.3%	(76.3, 87.0)	86.0%	(80.9, 89.9)	3.7	(-0.2, 7.5)	0.06
Members of Other Races	94.0%	(91.6, 95.8)	94.4%	(92.7, 95.8)	0.4	(-1.8, 2.6)	0.71
Drivers With							
No Passengers	88.3%	(86.6, 89.7)	89.5%	(87.7, 91.1)	1.3	(-0.3, 2.9)	0.10
At Least One Passenger	**90.4%**	**(88.6, 92.0)**	**92.8%**	**(91.2, 94.1)**	**2.4**	**(0.6, 4.2)**	**0.01**
Drivers With							
No Passengers	88.3%	(86.6, 89.7)	89.5%	(87.7, 91.1)	1.3	(-0.3, 2.9)	0.10
Passengers All Under 8	**89.6%**	**(86.6, 92.0)**	**94.0%**	**(91.0, 96.1)**	**4.4**	**(1.2, 7.7)**	**0.01**
Passengers All 8 and Older	**90.2%**	**(88.3, 91.9)**	**92.5%**	**(90.9, 93.9)**	**2.3**	**(0.5, 4.1)**	**0.01**
Some Passengers Under 8 and Some 8 or Older	93.3%	(91.0, 95.0)	94.5%	(91.8, 96.3)	1.2	(-1.8, 4.1)	0.42
Drivers 16-24 With							
No Passengers	87.8%	(85.0, 90.2)	86.1%	(79.7, 90.8)	-1.6	(-7.3, 4.0)	0.56
Passengers All 16-24	86.8%	(81.1, 91.1)	89.6%	(85.2, 92.8)	2.7	(-2.4, 7.9)	0.28
At Least One Passenger Not 16-24	89.5%	(82.9, 93.8)	91.5%	(84.7, 95.4)	1.9	(-6.3, 10.1)	0.63
Occupants 16-24 When							
All Occupants Are 16-24	86.5%	(83.2, 89.2)	86.2%	(81.1, 90.1)	-0.2	(-4.4, 3.9)	0.91
At Least One Occupant Is Not 16-24	86.0%	(82.6, 88.7)	87.4%	(82.8, 90.9)	1.4	(-3.9, 6.7)	0.59

[1] Drivers and right-front passengers of passenger vehicles with no commercial or government markings.
[2] Use of shoulder belts observed between 7 a.m. and 6 p.m.
[3] The Wilson Confidence Interval is used in the estimated percentages in the occupant group (e.g., occupants who are male), which is in the form: $\left\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\right\}/\left(2(n_{EFF} + t^2)\right)$, where p is the estimated percentage of Belt Use, $n_{EFF} = n/D_{EFF}$ is the effective sample size (where n is the sample size and D_{EFF} is the design effect), $t = t_{(1-\alpha/2)}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.
[4] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{(1-\alpha/2)}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{(1-\alpha/2)}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom in 2016 is different from that used in 2015.
[5] A P-value of 0.05 or less indicates that there is a statistically significant difference (at the alpha=0.05 level) between 2015 and 2016 estimates for the group in questions, indicated with bold type.
[6] The age, gender, and racial classifications are based on the subjective assessments of roadside observers.
Source: NOPUS, 2015, 2016

3. Seat Belt Use in Rear Seats

According to Federal Motor Vehicle Safety Standard (FMVSS) 208: Occupant Crash Protection, except for convertibles and open-body vehicles, all outboard designated seating positions shall be equipped with integral lap and shoulder belts at every forward facing, outboard designated seating position. Using the 2015 vehicle registration data from the National Vehicle Population Profile, R.L. Polk & Co., NHTSA estimated that 94.9 percent of passenger vehicles on the road have shoulder belts in the rear outboard seating positions. Of the 5.1 percent of vehicles that have only lap belts in the rear outboard seats, all observed rear-seat vehicle occupants are counted by NOPUS as *unbelted (not restrained with a shoulder belt)*, even if they are using lap belts. Consequently, NOPUS rear-seat shoulder belt use estimates reflect both the degree to which vehicle occupants use restraints and the availability of shoulder belts in these seating positions. Please note that NOPUS only observes up to two passengers in the second row of seats and none in the third row and beyond.

Table 3 on page 8 presents results of seat belt use in the rear seat of passenger vehicles in 2015 and 2016 as well as the changes between the two years. Some major results are highlighted below.

Seat Belt Use in Rear Seats Versus in Front Seats

Figure 6 displays the front and rear seat belt use trends from 2006 to 2016. As in previous years, seat belt use in 2016 was lower in the rear seat (80.6%) than in the front seat (90.1%).

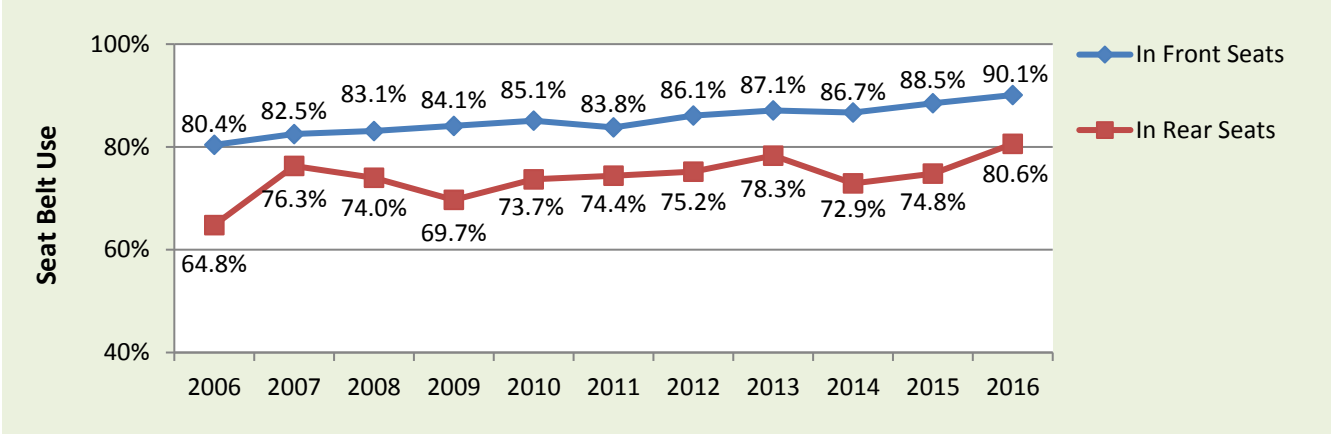

Figure 6: Seat Belt Use by Seating Position for Occupants 8 and Older, 2006-2016

Similar to the female occupants in the front seats, the seat belt use among female passengers in the rear seats also increased significantly from 75.5 percent in 2015 to 81.7 percent in 2016. Seat belt use continued to be lower among black occupants than occupants of the other race groups in both front and rear seats. However, seat belt use among black occupants in rear seats incrased significantly from 52.4 percent in 2015 to 71.4 percent in 2016.

State Laws and Rear-Seat Belt Use

At the time the 2016 NOPUS survey was conducted, 28 States and the District of Columbia required all vehicle occupants 18 and older to use seat belts when riding in the rear seats. Please note that rear-seat belt use laws are secondary in Arizona, Colorado, Idaho, Massachusetts, Missouri, Montana, Nebraska, Nevada, North Dakota, Ohio, Pennsylvania, South Dakota, Vermont, Virginia, and Wyoming. Secondary seat belt laws state that law enforcement officers may issue a ticket for not wearing a seat belt only when there is another citable traffic infraction.

Table 2 provides a list of States requiring seat belts be used in all seating positions.

Table 2: States With Laws Requiring Seat Belts Be Used in All Seating Positions

Alaska	California	Delaware
District of Columbia	Hawaii	Idaho
Illinois	Indiana	Kansas
Kentucky	Louisiana	Maine
Maryland	Massachusetts	Minnesota
Montana	Nevada	New Jersey
New Mexico	North Carolina	Oregon
Rhode Island	South Carolina	Texas
Utah	Vermont	Washington
Wisconsin	Wyoming	

States with laws in effect as of March 2017, requiring people 18 and older to use seat belts in all seating positions. Also includes the District of Columbia.

Figure 7 shows the trends of rear-seat belt use among passengers in the States with or without laws requiring belt use in all seating positions over a period of 11 years (2006 to 2016). As in previous years, seat belt use in rear seats in 2016 was higher in the States with laws requiring belt use in all seating positions (83.9%) than in the States requiring belt use only in the front seat (75.7%).

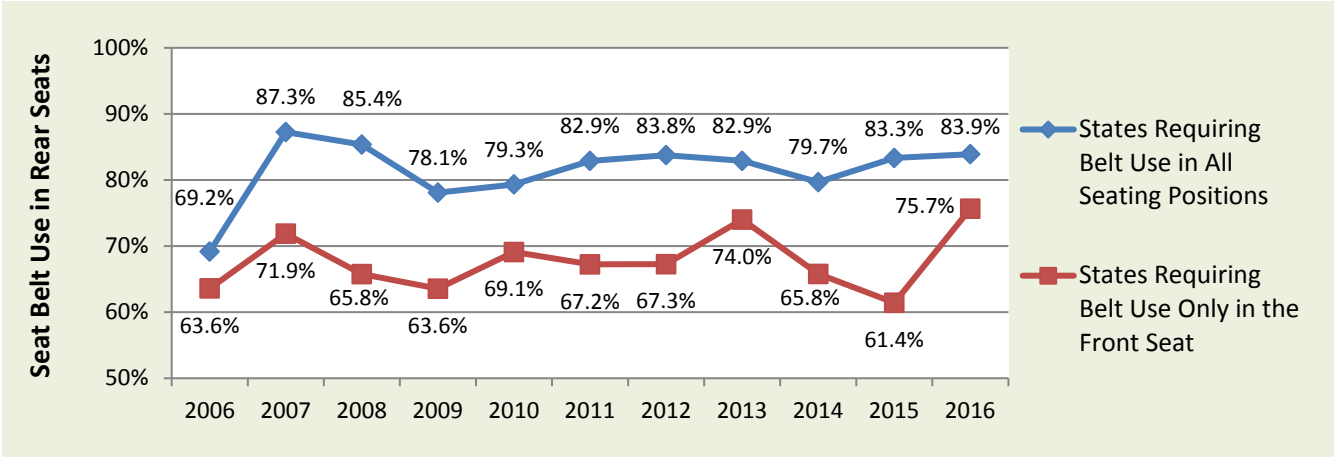

Figure 7: Seat Belt Use in Rear Seats by State Law Type for Occupants 8 and Older, 2006-2016

Table 3: Seat Belt Use in the Rear Seat of Passenger Vehicles, by Major Characteristics

Passenger Group[1]	2015		2016		2015 – 2016 Change		
	Belt Use[2]	95% Confidence Interval[3]	Belt Use[2]	95% Confidence Interval[3]	Change in Percentage	95% Confidence Interval[4]	P-value[5]
All Passengers	74.8%	(69.1, 79.7)	80.6%	(75.9, 84.5)	5.8	(-1.3, 12.9)	0.11
Males[6]	74.1%	(66.5, 80.5)	79.4%	(74.0, 83.9)	5.3	(-4.4, 15.0)	0.28
Females[6]	**75.5%**	**(70.8, 79.7)**	**81.7%**	**(76.9, 85.7)**	**6.2**	**(0.4, 12.0)**	**0.04**
Passengers by Age Group[6]							
8 to 15	82.0%	(75.0, 87.4)	86.0%	(81.6, 89.5)	4.0	(-2.7, 10.8)	0.23
16 to 24	72.6%	(65.9, 78.4)	78.2%	(70.7, 84.3)	5.6	(-4.1, 15.3)	0.25
25 to 69	64.4%	(56.0, 72.0)	76.8%	(68.8, 83.2)	12.4	(-0.1, 24.8)	0.05
70 and Older	81.3%	(68.4, 89.7)	74.9%	(56.8, 87.2)	-6.4	(-17.8, 5.0)	0.26
Passengers by Race[6]							
White	79.0%	(73.9, 83.2)	81.6%	(77.0, 85.4)	2.6	(-3.0, 8.2)	0.35
Black	**52.4%**	**(39.5, 64.9)**	**71.4%**	**(61.5, 79.7)**	**19.1**	**(0.9, 37.2)**	**0.04**
Members of Other Races	72.9%	(56.0, 85.0)	83.9%	(77.6, 88.6)	11.0	(-5.6, 27.5)	0.19
Passengers in States With Laws Requiring Belts Be Used							
In All Seating Positions	83.3%	(78.3, 87.4)	83.9%	(79.1, 87.8)	0.6	(-4.6, 5.7)	0.82
In the Front Seat Only	61.4%	(49.7, 72.0)	75.7%	(66.0, 83.3)	14.2	(-2.4, 30.8)	0.09

[1] Up to two passengers observed in the second row of seats in passenger vehicles with no commercial or government markings.
[2] Use of shoulder belts observed between 7 a.m. and 6 p.m.
[3] The Wilson Confidence Interval is used in the estimated percentages in the occupant group (e.g., occupants who are male), which is in the form: $\left\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\right\}/\left(2(n_{EFF} + t^2)\right)$, where p is the estimated percentage of Belt Use, $n_{EFF} = n/D_{EFF}$ is the effective sample size (where n is the sample size and D_{EFF} is the design effect), $t = t_{(1-\alpha/2)}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.
[4] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{(1-\alpha/2)}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{(1-\alpha/2)}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom in 2016 is different from that used in 2015.
[5] A P-value of 0.05 or less indicates that there is a statistically significant difference (at the alpha=0.05 level) between 2015 and 2016 estimates for the group in questions, indicated with bold type.
[6] The age, gender, and racial classifications are based on the subjective assessments of roadside observers.
Source: NOPUS, 2015, 2016

4. Child Restraint Use

In 2016 NOPUS continued to collect roadside observational data on child restraint use for all children under 8 years old. Detailed results of child restraint use are presented in Tables 5, 6, and 7. Table 5 on page 13 presents the results of child restraint use in passenger motor vehicles by major characteristics in 2015 and 2016 as well as the changes between the two years. Table 7 on page 15 divides the occupants into three age groups and reports restraint use by some other characteristics among these groups. Table 6 on page 14 presents results on child rear placement by major characteristics in 2015 and 2016 as well as the changes between the two years. Some of the major results of child restraint use are discussed below.

Child Restraint Use Among All Children Under 8

Restraint use for children under 8 in 2016 is 90.9 percent, up from 89.8 percent in 2015. Figure 8 shows the child restraint use trend since 2006.

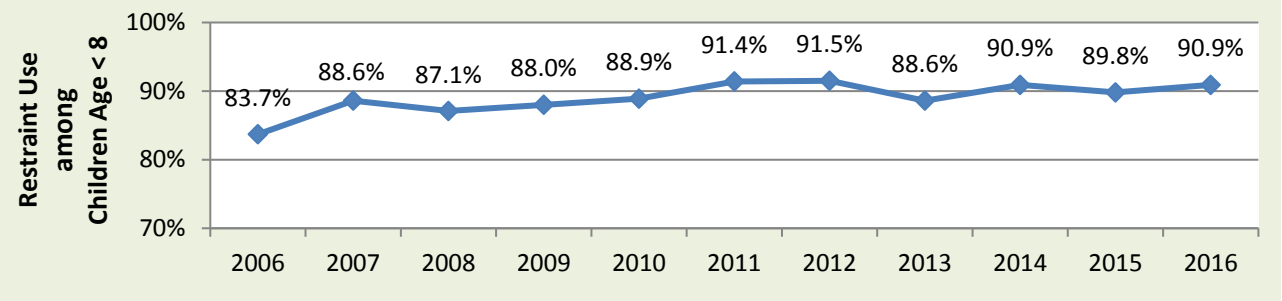

Figure 8: Child Restraint Use Among Children Under 8, 2006-2016

Child Rear Seat Placement

Figure 9 shows the trends of rear seat placement of children under age 8 between 2006 and 2016. The 2016 NOPUS found that 92.5 percent of children under 8 rode in the rear seats of vehicles. In the infant group (from birth to 12 months), 99.8 percent rode in the rear seat. 97.6 percent of 1- to 3-year-olds and 87.9 percent of 4- to 7-year-olds were in the rear seats in 2016. Note that the child restraint use in the rear seats increased to 91.8 percent in 2016 from 90.9 percent in 2015 (Table 5).

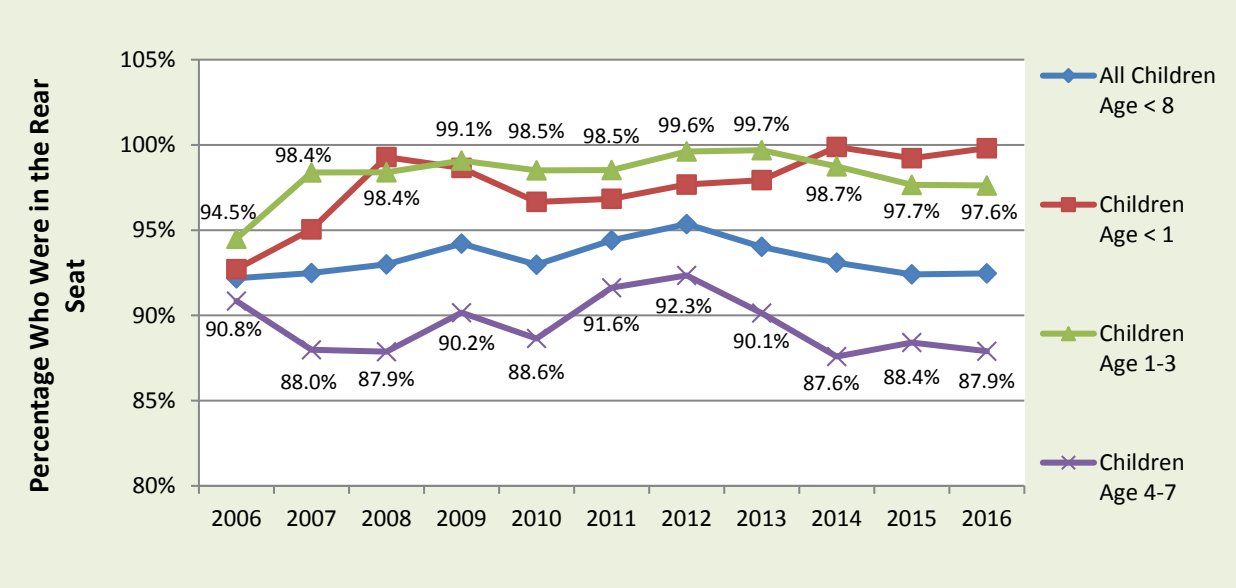

Figure 9: Child Rear Seat Placement, 2006 - 2016

At the time the 2016 survey was conducted, 9 States required children 5 and younger who weighed less than 80 pounds and were less than 54 inches tall to ride in the rear seats of vehicles. Table 4 lists the States with child rear placement laws.

Table 4: States With Laws Requiring Children 5 and Younger Be in the Rear Seat*

California	Georgia	Maine
New Jersey	Rhode Island	South Carolina
Tennessee	Washington	Wyoming

* Among children less than 80 pounds and less than 54" tall. States with laws in effect as of June 27, 2016. In no other States did such laws take effect during the period June 27, 2015, to June 27, 2016. In Delaware, children 11 and younger and 65 inches or less must be the rear seat if passenger air bag is active.

Child Restraint Use by Region

Restraint use among children decreased significantly to 90.7 percent in 2016 from 97.3 percent in 2015 in the West. There were no significant changes in child restraint use from 2015 to 2016 in the other three regions (Northeast, Midwest, and South), as shown in Figure 10.

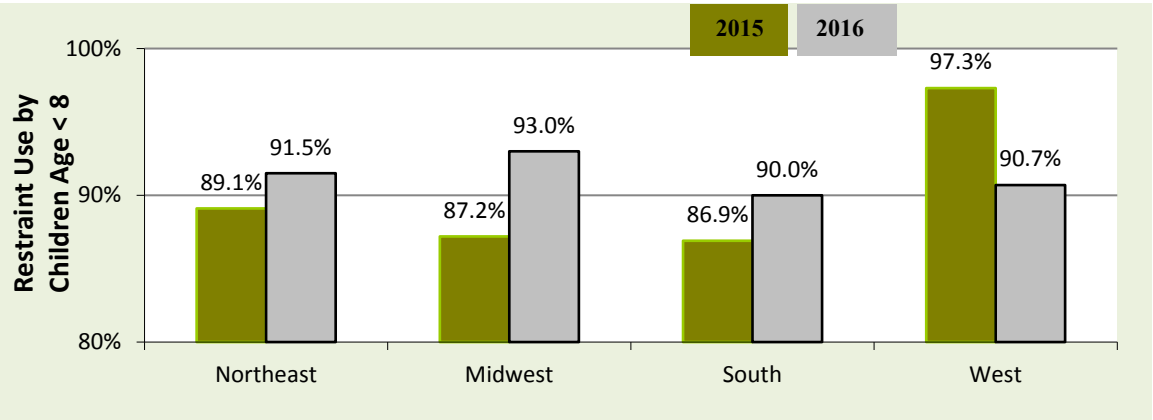

Figure 10: Child Restraint Use by Region in 2015 and 2016

Figure 11 shows that child restraint use is higher in the Midwest than in the other regions in 2016, which is different from the previous years.

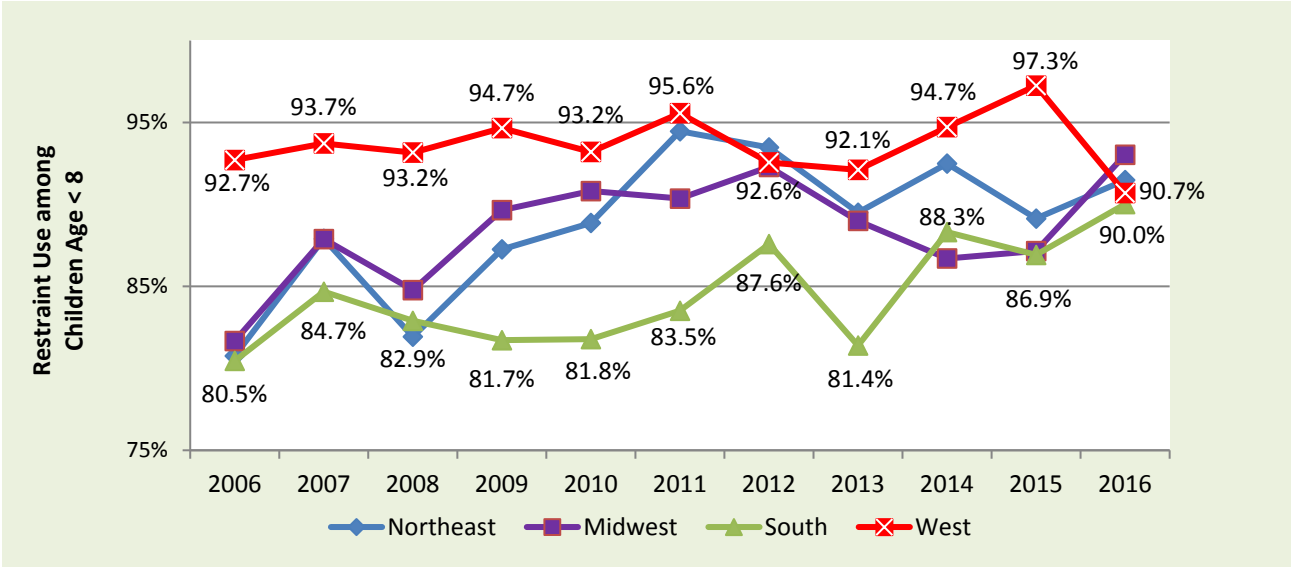

Figure 11: Child Restraint Use by Region, 2006-2016

Child Restraint Use by Time of Week

Child restraint use among child passengers increased from 89.3 percent in 2015 to 90.7 percent in 2016 during weekdays, however it is not a significant change. There were also no significant changes in child restraint use from 2015 to 2016 during any time periods of the week, as shown in Figure 12.

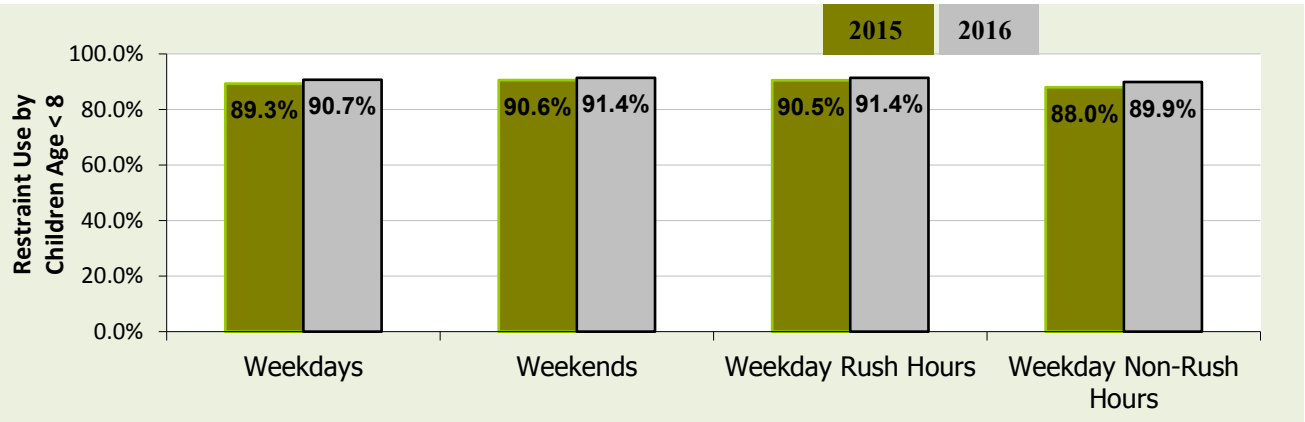

Figure 12: Child Restraint Use by Time of Week in 2015 and 2016

Child Restraint Use by Vehicle Type

As shown in Figure 13, restraint use for children traveling in pickup trucks increased from 87.0 percent in 2015 to 90.6 percent in 2016.

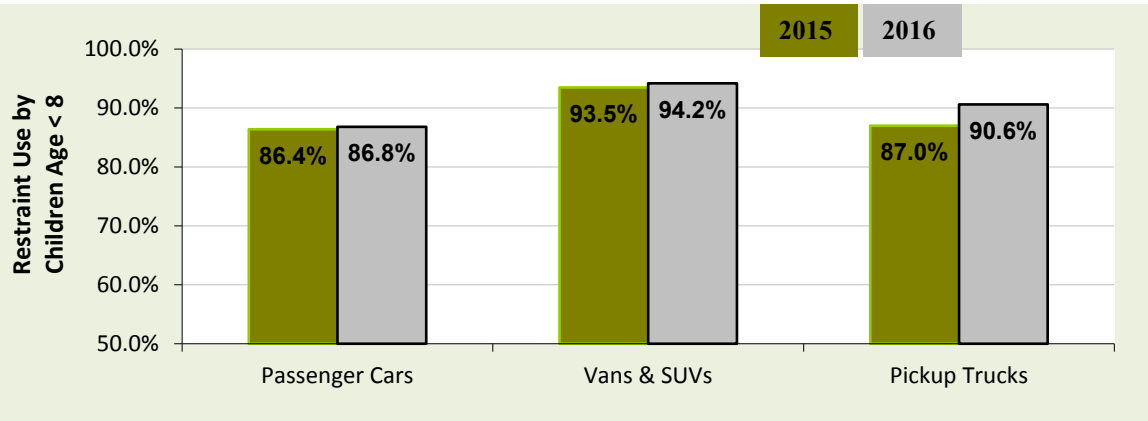

Figure 13: Child Restraint Use by Vehicle Type in 2015 and 2016

Child Restraint Use by Driver Type and Belt Status

Table 5 shows that the restraint use for children driven by any driver type do not have significant changes from 2015 to 2016.

As shown in Figure 14, restraint use for children driven by belted drivers continued to be significantly higher than for those driven by unbelted drivers.

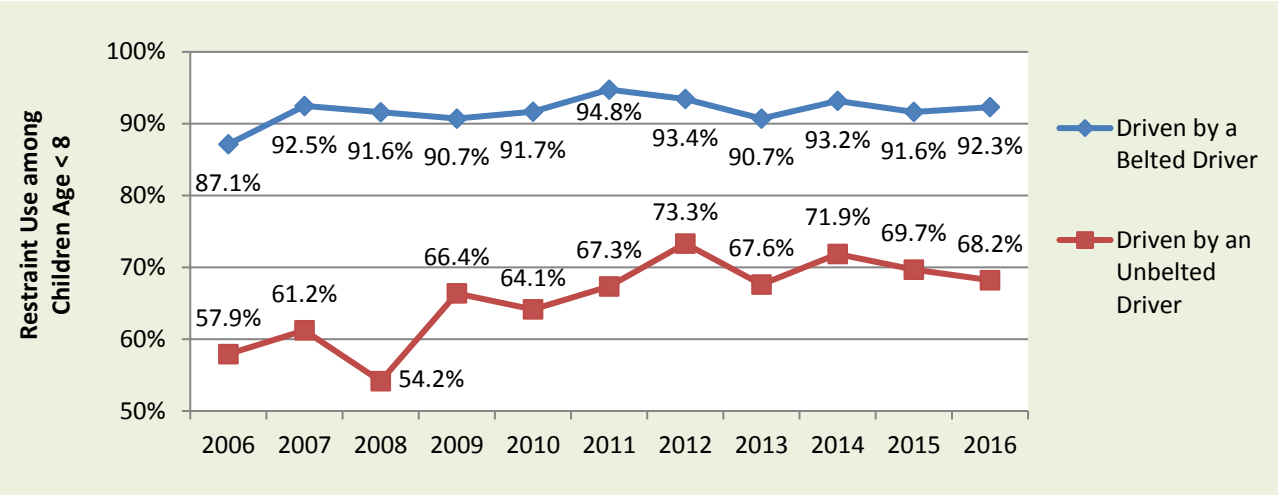

Figure 14: Child Restraint Use by Driver Belt Status, 2006-2016

Table 5: Child Restraint Use in Passenger Motor Vehicles, by Major Characteristics

Child Passenger Group[1]	2015		2016		2015-2016 Change		
	Restraint Use[2]	95% Confidence Interval[3]	Restraint Use[2]	95% Confidence Interval[3]	Change in Percentage Points	Confidence in a Change in Use[4]	P-value[5]
All Child Passengers (From Birth to 7 Years)	89.8%	(86.5, 92.3)	90.9%	(87.3, 93.6)	1.2	(-1.6, 4.0)	0.40
Children Driven by							
a Belted Driver	91.6%	(88.8, 93.8)	92.3%	(89.3, 94.5)	0.7	(-1.7, 3.1)	0.57
an Unbelted Driver	69.7%	(55.6, 80.8)	68.2%	(51.6, 81.2)	-1.5	(-15.2, 12.3)	0.83
a Male Driver	89.9%	(86.5, 92.5)	92.5%	(89.9, 94.5)	2.6	(-0.4, 5.7)	0.09
a Female Driver	89.7%	(85.4, 92.8)	90.0%	(84.9, 93.5)	0.3	(-3.8, 4.4)	0.88
a Driver 16 to 24	87.4%	(67.4, 95.9)	95.1%	(87.9, 98.1)	7.7	(-6.8, 22.3)	0.29
a Driver 25 to 69	89.8%	(86.7, 92.3)	90.5%	(86.9, 93.2)	0.7	(-2.4, 3.7)	0.66
a Driver 70 and Older	96.9%	(86.1, 99.4)	91.6%	(77.1, 97.2)	-5.3	(-16.5, 6.0)	0.34
a White Driver	92.6%	(90.0, 94.5)	94.0%	(91.2, 96.0)	1.5	(-1.1, 4.0)	0.26
a Black Driver	71.0%	(59.8, 80.1)	77.8%	(67.9, 85.3)	6.9	(-3.5, 17.2)	0.19
a Driver who is a Member of Other Races	89.9%	(82.0, 94.6)	85.2%	(79.1, 89.7)	-4.8	(-12.0, 2.4)	0.19
Children in							
the Front Seat	75.5%	(65.5, 83.3)	80.2%	(68.2, 88.4)	4.7	(-5.2, 14.6)	0.34
the Rear Seat	90.9%	(87.7, 93.4)	91.8%	(88.4, 94.3)	0.9	(-1.8, 3.6)	0.51
Child Passengers on							
Expressways	91.2%	(84.4, 95.2)	90.4%	(84.8, 94.2)	-0.8	(-5.3, 3.8)	0.73
Surface Streets	88.9%	(85.1, 91.8)	91.3%	(88.1, 93.7)	2.5	(-1.5, 6.4)	0.21
Child Passengers Traveling in							
Fast Traffic	91.5%	(85.8, 95.0)	89.6%	(84.2, 93.3)	-1.9	(-5.7, 1.9)	0.31
Medium-Speed Traffic	89.5%	(83.0, 93.7)	92.2%	(89.2, 94.4)	2.7	(-3.4, 8.8)	0.37
Slow Traffic	87.0%	(81.5, 91.0)	92.2%	(87.0, 95.4)	5.2	(-0.9, 11.3)	0.09
Child Passengers in							
Passenger Cars	86.4%	(81.2, 90.3)	86.8%	(81.8, 90.7)	0.4	(-4.4, 5.3)	0.86
Vans and SUVs	93.5%	(90.0, 95.8)	94.2%	(90.5, 96.5)	0.7	(-2.4, 3.7)	0.65
Pickup Trucks	87.0%	(80.2, 91.8)	90.6%	(82.8, 95.1)	3.6	(-4.4, 11.6)	0.37
Child Passengers in the							
Northeast	89.1%	(75.8, 95.6)	91.5%	(88.4, 93.8)	2.4	(-6.4, 11.1)	0.59
Midwest	87.2%	(80.1, 91.9)	93.0%	(83.5, 97.2)	5.9	(-1.3, 13.0)	0.10
South	86.9%	(80.2, 91.6)	90.0%	(83.8, 94.0)	3.1	(-2.1, 8.3)	0.23
West	**97.3%**	**(93.5, 98.9)**	**90.7%**	**(84.0, 94.8)**	**-6.6**	**(-11.3, -1.8)**	**0.01**
Child Passengers in							
Urban Areas	87.0%	(79.3, 92.2)	91.2%	(87.3, 93.9)	0.1	(-3.8, 4.0)	0.97
Rural Areas	**83.9%**	**(74.7, 90.1)**	**90.4%**	**(86.0, 93.6)**	**4.2**	**(0.5, 7.8)**	**0.03**
Child Passengers Traveling During							
Weekdays	89.3%	(85.2, 92.3)	90.7%	(86.4, 93.7)	1.4	(-2.4, 5.2)	0.47
Rush Hours	90.5%	(84.1, 94.5)	91.4%	(86.6, 94.6)	0.9	(-4.2, 6.1)	0.72
Non-Rush Hours	88.0%	(83.0, 91.6)	89.9%	(84.5, 93.5)	1.9	(-4.3, 8.1)	0.54
Weekends	90.6%	(87.1, 93.2)	91.4%	(87.0, 94.4)	0.9	(-3.2, 4.9)	0.67

[1] Passengers under age 8 observed between 7 a.m. and 6 p.m. in the right-front seat or the second row of seats in passenger vehicles with no commercial or government markings that are stopped at a stop sign or stoplight. Age, gender, and racial classifications are based on the subjective assessments of roadside observers.

[2] Use of child car seats (forward- or rear-facing), booster seats, and seat belts.

[3] The Wilson Confidence Interval is used in the estimated percentages in the occupant group (e.g., occupants who are male), which is in the form: $\left\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\right\}/\left(2(n_{EFF} + t^2)\right)$, where p is the estimated percentage of Belt Use,

$n_{EFF} = n/D_{EFF}$ is the effective sample size (where n is the sample size and D_{EFF} is the design effect), $t = t_{(1-\alpha/2)}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.

[4] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{(1-\alpha/2)}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{(1-\alpha/2)}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom in 2016 is different from that used in 2015.

[5] A P-value of 0.05 or less indicates that there is a statistically significant difference (at the alpha=0.05 level) between 2015 and 2016 estimates for the group in questions, indicated with bold type.

Source: NOPUS, 2015, 2016

Table 6: The Percent of Children Who Rode in the Rear Seat, by Major Characteristics

Child Passenger Group[1]	2015		2016		2015-2016 Change		
	Percentage Who Were in Rear Seat[2]	95% Confidence Interval[3]	Percentage Who Were in Rear Seat[2]	95% Confidence Interval[3]	Change in Percentage Points	Confidence in a Change in Use[4]	P-value[5]
All Child Passengers (From Birth to 7 Years)	92.4%	(89.9, 94.3)	92.5%	(89.4, 94.7)	0.1	(-3.3, 3.4)	0.97
0 (Infants)	99.2%	(98.2, 99.7)	99.8%	(98.8, 100.0)	0.6	(-0.2, 1.4)	0.14
1-3	97.7%	(95.0, 98.9)	97.6%	(95.5, 98.8)	0.0	(-3.0, 2.9)	0.98
4-7	88.4%	(84.2, 91.6)	87.9%	(83.2, 91.4)	-0.5	(-5.9, 4.9)	0.85
Child Passengers in States With[6]							
Law Requiring Children From Birth of 5 Years Be in the Rear Seat	**88.7%**	**(82.9, 92.7)**	**95.0%**	**(92.6, 96.6)**	**6.3**	**(0.6, 11.9)**	**0.03**
No Such Law	93.3%	(91.1, 95.0)	91.6%	(87.7, 94.3)	-1.7	(-5.0, 1.5)	0.28
Children Driven by							
a Belted Driver	93.2%	(90.5, 95.2)	93.0%	(89.9, 95.2)	-0.2	(-3.7, 3.2)	0.89
an Unbelted Driver	83.9%	(77.7, 88.7)	84.3%	(78.1, 89.0)	0.4	(-6.8, 7.5)	0.92
a Male Driver	93.0%	(89.9, 95.2)	91.7%	(88.1, 94.3)	-1.3	(-5.0, 2.4)	0.48
a Female Driver	92.0%	(89.2, 94.1)	92.9%	(89.8, 95.2)	1.0	(-2.8, 4.7)	0.60
a Driver 16 to 24	94.2%	(84.2, 98.0)	99.6%	(97.9, 99.9)	5.3	(-1.1, 11.8)	0.10
a Driver 25 to 69	92.4%	(90.0, 94.2)	92.1%	(88.8, 94.4)	-0.3	(-3.7, 3.1)	0.86
a Driver 70 and Older	86.3%	(56.1, 96.9)	74.6%	(46.2, 90.9)	-11.8	(-44.8, 21.3)	0.47
a White Driver	92.9%	(89.4, 95.2)	92.4%	(88.4, 95.1)	-0.5	(-4.5, 3.5)	0.81
a Black Driver	90.7%	(84.4, 94.7)	92.3%	(87.7, 95.2)	1.5	(-2.8, 5.9)	0.47
a Driver who is a Member of Other Races	91.4%	(86.7, 94.5)	93.1%	(88.8, 95.8)	1.7	(-4.5, 7.8)	0.58
Child Passengers on							
Expressways	94.4%	(89.3, 97.2)	95.2%	(91.0, 97.5)	0.8	(-3.8, 5.3)	0.73
Surface Streets	91.1%	(89.1, 92.8)	90.3%	(86.4, 93.2)	-0.8	(-4.7, 3.1)	0.68
Child Passengers Traveling in							
Fast Traffic	92.2%	(87.4, 95.3)	93.5%	(89.5, 96.0)	1.3	(-3.6, 6.1)	0.60
Medium-Speed Traffic	91.3%	(88.2, 93.7)	93.0%	(89.1, 95.5)	1.6	(-1.8, 5.1)	0.34
Slow Traffic	94.0%	(91.0, 96.1)	89.5%	(84.0, 93.2)	-4.6	(-10.3, 1.2)	0.11
Child Passengers in							
Passenger Cars	93.7%	(91.3, 95.5)	92.5%	(87.9, 95.4)	-1.2	(-5.4, 3.0)	0.56
Vans and SUVs	94.4%	(92.2, 96.0)	94.5%	(91.9, 96.3)	0.1	(-2.8, 3.0)	0.96
Pickup Trucks	74.2%	(62.2, 83.4)	79.9%	(72.8, 85.6)	5.8	(-7.6, 19.1)	0.39
Child Passengers in the							
Northeast	97.1%	(95.5, 98.1)	97.3%	(95.1, 98.5)	0.2	(-1.6, 2.1)	0.79
Midwest	91.7%	(88.2, 94.2)	89.4%	(81.6, 94.1)	-2.3	(-10.6, 6.0)	0.58
South	90.7%	(84.5, 94.6)	91.7%	(85.5, 95.4)	1.0	(-5.5, 7.6)	0.75
West	93.8%	(90.3, 96.1)	94.1%	(91.3, 96.0)	0.3	(-3.3, 3.9)	0.86
Child Passengers in							
Urban Areas	94.5%	(91.1, 96.7)	93.4%	(90.6, 95.4)	-0.3	(-4.3, 3.7)	0.86
Rural Areas	87.3%	(82.3, 91.0)	90.4%	(84.6, 94.1)	1.4	(-1.6, 4.4)	0.36
Child Passengers Traveling During							
Weekdays	91.0%	(88.1, 93.3)	92.1%	(88.7, 94.6)	1.1	(-2.7, 4.9)	0.55
Rush Hours	90.8%	(86.6, 93.7)	93.1%	(89.1, 95.7)	2.4	(-2.9, 7.7)	0.37
Non-Rush Hours	91.3%	(87.8, 93.8)	91.0%	(87.6, 93.6)	-0.2	(-3.6, 3.1)	0.89
Weekends	94.8%	(91.3, 96.9)	93.1%	(89.3, 95.6)	-1.7	(-5.0, 1.6)	0.30
Child Passengers in a							
Rear-Facing Car Seat	99.6%	(98.8, 99.8)	99.9%	(99.4, 100.0)	0.3	(-0.2, 0.8)	0.18
Forward-Facing Car Seat	98.5%	(95.7, 99.5)	98.8%	(97.3, 99.5)	0.3	(-1.7, 2.3)	0.73
High-Backed Booster Seat	98.7%	(96.1, 99.6)	99.4%	(98.0, 99.8)	0.7	(-1.0, 2.5)	0.40
Seat belt or Backless Booster Seat	86.6%	(81.1, 90.7)	85.5%	(78.5, 90.5)	-1.1	(-8.3, 6.0)	0.74
No Restraint Observed	81.8%	(74.0, 87.7)	83.5%	(78.1, 87.9)	1.7	(-6.6, 10.0)	0.68

[1]Passengers under 8 observed between 7 a.m. and 6 p.m. in the right-front seat or the second row of seats in passenger vehicles with no commercial or government markings that are stopped at a stop sign or stoplight. Age, gender, and racial classifications are based on the subjective assessments of roadside observers.

[2] The percentage of the child passenger group who were in the second row of seats at the time of observation.

[3] The Wilson Confidence Interval is used in the estimated percentages in the occupant group (e.g., occupants who are male), which is in the form: $\left\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\right\}/\left(2(n_{EFF} + t^2)\right)$, where p is the estimated percentage of Belt Use, $n_{EFF} = n/D_{EFF}$ is the effective sample size (where n is the sample size and D_{EFF} is the design effect), $t = t_{(1-\alpha/2)}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.

[4] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{(1-\alpha/2)}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{(1-\alpha/2)}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom in 2016 is different from that used in 2015.

[5] A P-value of 0.05 or less indicates that there is a statistically significant difference (at the alpha=0.05 level) between 2015 and 2016 estimates for the group in questions, indicated with bold type.

Source: NOPUS, 2015, 2016

Table 7: Child Restraint Use in Passenger Motor Vehicles, by Age and Other Characteristics

Child Passenger Group[1]	2015		2016		2015-2016 Change		
	Restraint Use[2]	95% Confidence Interval[3]	Restraint Use[2]	95% Confidence Interval[3]	Change in Percentage Points	Confidence in a Change in Use[4]	P-value[5]
Infants (From Birth to 12 Months)							
Infants Driven by							
a Belted Driver	97.3%	(90.7, 99.3)	98.6%	(96.6, 99.4)	1.3	(-2.0, 4.6)	0.42
an Unbelted Driver	NA	NA	NA	NA	NA	NA	NA
a Male Driver	94.9%	(82.0, 98.7)	98.6%	(95.9, 99.5)	3.7	(-4.1, 11.4)	0.34
a Female Driver	99.2%	(97.9, 99.7)	98.5%	(95.3, 99.5)	-0.7	(-2.5, 1.1)	0.42
Infants in							
Passenger Cars	94.7%	(84.2, 98.3)	97.3%	(92.0, 99.1)	2.6	(-3.0, 8.2)	0.36
Vans and SUVs	100.0%	(100.0, 100.0)	99.4%	(97.7, 99.9)	-0.6	(-1.4, 0.3)	0.20
Pickup Trucks	NA	NA	NA	NA	NA	NA	NA
Infants in the							
Northeast	98.5%	(92.2, 99.7)	99.1%	(94.4, 99.9)	0.6	(-3.9, 5.1)	0.78
Midwest	99.6%	(97.6, 99.9)	100.0%	(100.0, 100.0)	0.4	(-0.4, 1.2)	0.33
South	93.1%	(78.0, 98.1)	98.7%	(96.3, 99.5)	5.6	(-4.0, 15.2)	0.24
West	100.0%	(100.0, 100.0)	96.2%	(85.7, 99.1)	-3.8	(-9.5, 2.0)	0.19
Infants in							
Urban Areas	99.6%	(98.5, 99.9)	98.0%	(95.2, 99.2)	-1.6	(-3.6, 0.4)	0.11
Rural Areas	90.2%	(71.9, 97.1)	100.0%	(100.0, 100.0)	9.8	(-2.3, 21.9)	0.11
Children 1 to 3							
Children 1-3 Driven by							
a Belted Driver	96.1%	(93.4, 97.7)	95.6%	(92.5, 97.4)	-0.5	(-3.2, 2.2)	0.71
an Unbelted Driver	80.4%	(58.0, 92.5)	86.6%	(68.4, 95.1)	6.2	(-16.8, 29.2)	0.59
a Male Driver	94.2%	(87.4, 97.4)	96.2%	(93.2, 97.9)	2.1	(-3.1, 7.2)	0.42
a Female Driver	95.0%	(90.5, 97.5)	94.5%	(90.3, 96.9)	-0.5	(-4.8, 3.7)	0.80
Children 1-3 in							
Passenger Cars	92.2%	(86.1, 95.7)	93.6%	(89.0, 96.3)	1.4	(-4.1, 6.9)	0.61
Vans and SUVs	96.4%	(91.6, 98.5)	96.7%	(92.8, 98.5)	0.3	(-3.8, 4.4)	0.89
Pickup Trucks	99.2%	(95.4, 99.9)	90.1%	(71.0, 97.2)	-9.1	(-21.8, 3.6)	0.16
Children 1-3 in the							
Northeast	95.2%	(84.9, 98.6)	91.5%	(75.2, 97.4)	-3.8	(-14.6, 7.1)	0.48
Midwest	91.3%	(78.2, 96.9)	96.7%	(91.0, 98.8)	5.4	(-4.7, 15.4)	0.28
South	94.1%	(91.3, 96.1)	93.2%	(86.9, 96.6)	-0.9	(-6.5, 4.7)	0.74
West	97.9%	(89.8, 99.6)	98.4%	(94.7, 99.5)	0.4	(-3.6, 4.5)	0.82
Children 1-3 in							
Urban Areas	95.6%	(92.2, 97.6)	95.0%	(91.1, 97.3)	-0.6	(-4.1, 2.9)	0.72
Rural Areas	91.8%	(84.4, 95.9)	95.3%	(91.7, 97.3)	3.4	(-2.7, 9.5)	0.26
Children 4 to 7							
Children 4-7 Driven by							
a Belted Driver	88.2%	(84.4, 91.2)	89.1%	(85.0, 92.2)	0.9	(-2.5, 4.3)	0.59
an Unbelted Driver	61.2%	(45.1, 75.1)	49.2%	(28.3, 70.3)	-12.0	(-31.9, 7.1)	0.23
a Male Driver	86.8%	(83.0, 89.8)	89.7%	(85.8, 92.6)	2.9	(-0.8, 6.7)	0.12
a Female Driver	85.0%	(78.8, 89.7)	85.0%	(77.4, 90.4)	-0.1	(-5.8, 5.6)	0.98
Children 4-7 in							
Passenger Cars	81.5%	(74.3, 87.1)	80.4%	(72.9, 86.2)	-1.2	(-8.2, 5.8)	0.74
Vans and SUVs	90.7%	(85.8, 94.0)	91.5%	(86.7, 94.7)	0.8	(-3.3, 4.9)	0.69
Pickup Trucks	81.3%	(70.3, 88.8)	89.4%	(78.4, 95.1)	8.1	(-1.6, 17.8)	0.10
Children 4-7 in the							
Northeast	83.6%	(61.9, 94.1)	89.5%	(79.3, 95.0)	5.9	(-3.7, 15.5)	0.22
Midwest	83.0%	(75.3, 88.6)	88.8%	(72.9, 95.9)	5.8	(-4.5, 16.1)	0.26

	South	82.7%	(72.8, 89.5)	86.9%	(78.0, 92.5)	4.2	(-3.3, 11.6)	0.26
	West	**96.1%**	**(92.8, 97.9)**	**84.6%**	**(76.6, 90.3)**	**-11.4**	**(-18.2, -4.6)**	**0.00**
Children 4-7 in								
	Urban Areas	86.8%	(82.0, 90.5)	86.8%	(81.3, 90.9)	0.0	(-5.6, 5.7)	0.99
	Rural Areas	83.3%	(75.2, 89.1)	87.1%	(79.6, 92.2)	3.9	(-1.2, 9.0)	0.13

[1] Passengers under 8 observed between 7 a.m. and 6 p.m. in the right-front seat or the second row of seats in passenger vehicles with no commercial or government markings that are stopped at a stop sign or stoplight. Age, gender, and racial classifications are based on the subjective assessments of roadside observers.
[2] Use of child car seats (forward- or rear-facing), booster seats, and seat belts.
[3] The Wilson Confidence Interval is used in the estimated percentages in the occupant group (e.g., occupants who are male), which is in the form: $\left\{(2n_{EFF}p + t^2) \pm t\sqrt{(t^2 + 4n_{EFF}pq)}\right\}/\left(2(n_{EFF} + t^2)\right)$, where p is the estimated percentage of Belt Use, $n_{EFF} = n/D_{EFF}$ is the effective sample size (where n is the sample size and D_{EFF} is the design effect), $t = t_{(1-\alpha/2)}(df)$, is a multiplier from the t-distribution with df degrees of freedom, and $q = 1 - p$. For percentages these endpoints are multiplied by 100.
[4] The regular symmetric interval was used for the estimated change in percentage point, which is in the form: $p \pm t_{(1-\alpha/2)}(df)\sqrt{v(p)}$, where p is the estimated change in percentage point, $v(p)$ is its estimated variance, and $t_{(1-\alpha/2)}(df)$ is a multiplier from the t-distribution with df degrees of freedom. The degrees of freedom in 2016 is different from that used in 2015.
[5] A P-value of 0.05 or less indicates that there is a statistically significant difference (at the alpha=0.05 level) between 2015 and 2016 estimates for the group in questions, indicated with bold type.
Source: NOPUS, 2015, 2016

5. NOPUS Methodology

The NOPUS sample was redesigned and the new design has been implemented to conduct the 2015 survey. This section discusses the sample design, data collection, and estimation used in the 2016 NOPUS Controlled Intersection Study. Data collection, estimation, and variance estimation for NOPUS are conducted by Westat, Inc., under the direction of the NCSA under Federal contract number DTNH22-13-D-00284.

Sample Design

The NOPUS uses a complex multistage probability sample, statistical data editing, imputation for unknown values and complex estimation procedures. The NOPUS sample was redesigned in 2015 and implemented to conduct the 2015 and 2016 survey. The sample sites for the 2016 NOPUS were entirely from the 2015 NOPUS sample redesign.

The redesigned NOPUS sample was selected using a stratified two-stage design. The first stage of selection was the county, referred to as the PSU within the design framework. The PSUs were targeted for selection based on their measure of size (MOS). A sample of 57 primary sampling units (PSUs) were selected from a frame of 1,588 PSUs.

The second stage of selection or secondary sampling unit (SSU), within the selected PSUs, is the road segment. At the road segment level, the NOPUS data collectors are then positioned so that they can efficiently observe seat belt use, motorcycle helmet use, and driver electronic device use..

The NOPUS sample frame of PSUs excluded Puerto Rico and the U.S. Territories. All other counties in the U.S. were included in the sampling frame with the exception of 37 counties and three areas in Alaska; these locations were excluded on the basis of low traffic volume measured in terms of vehicle miles traveled (VMT) or because they were geographically isolated. The sample frame of SSUs excluded segments along unnamed roads, cul-de-sacs, private roads, and a variety of other road types that have traditionally had very low traffic volume measured by VMT.

The PSUs consist of individual counties or groups of counties within state boundaries. The NOPUS PSU sampling frame consists of 1,588 PSUs. One PSU was sampled with certainty because of its large VMT, and the remaining PSUs are then grouped into the eight major strata based on the four Census region (Northeast, Midwest, South, and West) and two urbanicity classes (Urban and Rural). A sample of 57 PSUs was selected using a Sequential Poisson method[4] with probability approximately proportional to the VMT as the MOS. The new NOPUS sample was selected to maximize PSU overlap with the old sample, thus maintaining comparability of the estimates from the current and previous samples. A SSU sample of road segments within each PSU is selected based upon the types of roads and urban/rural status with specified sampling rates.

Table 8 shows the observed sample sizes of the 2016 NOPUS. A total of 66,993 occupants were observed in 48,177 vehicles at 1,600 data collection sites. Of these observed occupants, 2,849

were children under 8. Please note that due to ineligibility, construction, danger in the area, or road closure, observations could not be completed at some of the sampled observation sites.

Table 8: Sites, Vehicles, and Occupants in the 2016 NOPUS

Numbers of	2015	2016	Percentage Change
Sites Observed	1,566	1,600	2.17%
Vehicles Observed	45,916	48,177	4.92%
Total Occupants	63,958	66,993	4.75%
Occupants 8 and Older	60,958	64,144	5.23%
In Front Seat	58,159	63,963	9.98%
In Rear Seat	2,799	3,030	8.25%
Occupants Under 8	3,000	2,849	-5.03%
Children Under 1	355	322	-9.30%
Children 1 to 3	952	931	-2.21%
Children 4 to 7	1,693	1,596	-5.73%

Data Collection

The 2016 NOPUS data collection was conducted during the period from June 6, 2016, to June 25, 2016.

Data collection protocols remain largely the same in the redesigned NOPUS; however, NHTSA has made some minor adjustments to streamline data collection. In order to provide an estimate based on all vehicles affected by seat belt laws in relevant jurisdictions, data collectors observe and record seat belt use for all passenger vehicles observed at the data collection sites.

In NOPUS Controlled Intersection Study, trained data collectors observe restraint use of drivers and other occupants of passenger vehicles (passenger cars, pickup trucks, SUVs, and vans) which have stopped at a stop sign or stoplight during daylight hours between 7 a.m. and 6 p.m. Observations are made both on the surface streets and at the ends of the expressway exit ramps (where there are controlled intersections). Only stopped vehicles are observed based on the time required to collect the variety of information required by the survey, including subjective assessments of the vehicle occupants' age and race. Observers collect data on the driver, right-front passenger, and up to two passengers in the second row of seats. Observers do not interview vehicle occupants intentionally, allowing NOPUS to capture the uninfluenced behavior of the occupants.

The NOPUS Controlled Intersection Study is always done following NOPUS Moving Traffic Survey and is usually scheduled for all surface streets and limited access highway ramps, where NOPUS data from previous years indicates that a controlled intersection exists. If the data collectors arrive at an assigned surface street site and the site is not controlled, they are instructed to search for an alternate data collection site further along the same road segment.

After the data collectors have located a controlled intersection, they position themselves at the traffic signal or stop sign, facing the oncoming traffic from the side of the road. The data collectors walk in the direction of the oncoming traffic, away from the intersection to make their observations. When the traffic light turns green or they finish observing all vehicles, the data collectors return to the intersection to wait for the next traffic light cycle or next vehicle. They observe vehicles in the lane closest to their observational position, even if the closest lane is an exclusive turn lane (which is often the case at the controlled intersections.) When possible and if visibility allows, the data collectors also observe the other lanes of traffic. The data collectors are instructed to record the first behavior of the driver in which they observe.

Estimation

NOPUS estimates the rate of occupants restrained in restraint type (R) among the occupants having characteristic (C) using the formula,

$$\text{Restraint Use}_{\text{CR}} = \frac{\sum_{i,j,k} w_{ijk} F_{ijk} CR_{ijk}}{\sum_{i,j,k} w_{ijk} F_{ijk} C_{ijk}},$$

where w_{ijk} and F_{ijk}, respectively, denote the base weight and the product of various weight adjustment factors at the site k in the stratum j of the PSU i. CR_{ijk} stands for the number of observed occupants having characteristic C and restrained in restraint type R and C_{ijk} denotes the number of observed occupants having characteristic C at the site k in the stratum j of the PSU i. For example, the seat belt use by vehicle type is estimated using the above formula, where CR_{ijk} is the number of observed belted occupants in certain type of vehicles (such as passenger cars, vans & SUVs, or pickup trucks) and C_{ijk} is the number of ALL (belted and unbelted) occupants observed in that type of vehicles at the site k in the stratum j of the PSU i.

Prior to 2015, NHTSA's NOPUS publications reported integer percentage values for seat belt use point estimates. Along with updating the survey design, NHTSA has revised its NOPUS reporting format to be consistent with statistical best practices across the Federal Government. The new reporting format presents percentage point estimates with one decimal place. Along with this change, 95 percent confidence intervals and p-values accompany the point estimates.

In certain instances, NHTSA does not provide estimates. These are typically restraint use estimates whose numerator is based on fewer than five persons observed, or whose denominator is based on fewer than 30 people observed. These are reported as "NA" in publications. Any related estimate (i.e., change in use and confidence estimates) is not reported as well. The same criteria are used in reporting estimates from the National Survey of Use of Booster Seats (NSUBS).

6. References

[1] Pickrell, T. M., & Li, R. (2016, November). *Seat belt use in 2016 – Overall results* (Traffic Safety Facts Research Note. Report No. DOT HS 812 351). Washington, DC: National Highway Traffic Safety Administration. Available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812351

[2] Pickrell, T. M., Choi, E.-H., & KC, S. (2016, February). *Occupant restraint use in 2015: Results from the NOPUS controlled intersection study* (Traffic Safety Facts Research Note. Report No. DOT HS 812 330). Washington, DC: National Highway Traffic Safety Administration. Available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812330

[3] Highway Loss Data Institute. (2017, March). Safety belts (Web page). Arlington, VA: Insurance Institute for Highway Safety. Available at www.iihs.org/iihs/topics/laws/safetybeltuse?topicName=safety-belts

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