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Research Note



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National Occupant Protection Use Survey: Controlled Intersection Detailed Results

In late 1994, NHTSA conducted the first National Occupant Protection Use Survey (NOPUS). Shoulder belt use was observed at a random sample of sites across the country for drivers and right-front passengers of cars and light trucks. In one portion of the study, called the *controlled intersection study*, license plate numbers were recorded in addition to shoulder belt use. The license plate numbers were matched to vehicle registration files for each state in the study. The registration information provided specific information on the vehicle, including make, model year, and vehicle identification number (VIN). This research note presents belt use rates by specific vehicle characteristics.

Highlights

- Drivers of the largest cars had the lowest shoulder belt use among car drivers.
- Drivers of minivans had the highest shoulder belt use and drivers of pickups the lowest among light truck drivers.
- Drivers with manual belts and no air bag had the lowest belt use and drivers with automatic belts the highest.
- Drivers of newer cars had higher belt use than drivers of older cars.

Data Collection Summary

Data collection for the controlled intersection study was conducted for 40 minutes at each of 2,500 randomly selected intersections with stop signs or traffic signals. Pairs of observers recorded shoulder belt use for drivers and right-front passengers of passenger cars and light trucks (vans, minivans, sport utility vehicles, and pickup trucks), the vehicle's license plate number, and the age group, sex and race of the observed person. Age, sex, and race were based on the best judgment of the observers. Child restraint information was collected for children under five in the front and second seats of the vehicle. Every day of the week and all daylight hours (8 a.m. to 6 p.m.) were covered by the

study. Commercial and emergency vehicles were excluded.

Estimation Procedures

Previously published results from the NOPUS were based on all passenger cars and light trucks that were observed during data collection. The detailed estimates produced for this research note, however, are based on a subset of vehicles for which specific vehicle information could be obtained. Vehicle registration information could not be obtained for some vehicles for several reasons. License plate numbers may have been incorrectly recorded during data collection or incorrectly entered during data processing.

Also, since some states were not able to provide information for their vehicles until almost a year after the data had been collected, some vehicles may no longer have been in their registration files. In addition, even when the VINs were obtained from the states, the VIN decoding program could only be used for vehicles no older than 15 model years.

Of the 50,442 passenger cars observed during data collection, 87 percent were identified in the state's vehicle registration files and could be decoded during VIN decoding. For light trucks, the numbers were much lower -- only 61 percent of the 22,230 trucks observed during data collection were identified and decoded. This may be due to many of the observed trucks being older than 15 model years or the way in which states maintain their truck registration files.

Each estimate in the following tables has been statistically weighted according to the sample design. Since these are estimates from a sample, each has an associated margin of error or standard error. Two standard errors are given in parentheses next to each estimate.

By adding and subtracting two standard errors from the estimates, an approximate 95% confidence interval can be created. This means that you can be 95% sure that the true use rate lies within this interval. More information about the sample design and the estimation

procedures is available from the National Center for Statistics and Analysis.

Car Size Results

Vehicle length (wheelbase) was derived from the VIN for passenger cars. Cars were placed in general size categories as follows:

- *Minicompact* (wheelbase under 95 inches) includes cars such as the Geo Metro or Hyundai Excel.
- *Subcompact* (wheelbase 95 to 99 inches) includes cars such as the Toyota Corolla or Nissan Sentra.
- *Compact* (wheelbase 100 to 104 inches) includes cars such as the Chevy Cavalier or Ford Mustang.
- *Intermediate* (wheelbase 105 to 109 inches) includes cars such as the Ford Taurus or Honda Accord.
- *Full Size* (wheelbase 110 to 114 inches) includes cars such as the Buick LeSabre or Ford Thunderbird.
- *Largest Size* (wheelbase 115 inches and over) includes cars such as Lincoln Towncar or Chevy Caprice.

As shown in **Table 1**, shoulder belt use varied slightly by car size. Belt use in subcompact cars was the highest, and belt use in the largest size cars was the lowest.

Table 1: Percent Shoulder Belt Use by Passenger Car Size and Occupant Type
(Estimates and 2 Standard Errors)

Car Size	All Occupants	Driver	Passenger
All Cars	64.9 (4.2)	65.4 (4.0)	63.7 (5.0)
Mini-compact	61.9 (5.0)	63.6 (4.8)	54.9 (9.0)
Sub-compact	67.2 (4.2)	67.7 (4.2)	65.2 (5.4)
Compact	64.8 (4.6)	65.6 (4.6)	63.8 (6.2)
Intermediate	65.9 (4.4)	66.8 (4.2)	65.7 (7.4)

Full	65.2 (5.4)	64.9 (5.6)	70.0 (6.0)
Largest	56.9 (6.4)	57.0 (6.2)	55.7 (11.2)

Truck Type Results

The light trucks (trucks with a gross vehicle weight rating of less than 10,000 pounds) were grouped by truck type using information from the decoded VIN. These truck groups are commonly used by NHTSA to classify vehicles for analyses:

- ▣ *Minivans* are vehicles such as the Dodge Caravan or Toyota Previa.
- ▣ *Standard Vans* are full-size vans such as the Ford Econoline.
- ▣ *Compact Pickups* are vehicles such as the Dodge Dakota or Toyota Pickup.
- ▣ *Standard Pickups* are large pickups such as the Dodge Ram Pickup or Jeep Pickup
- ▣ *Utility Vehicles* include vehicles such as the Jeep Cherokee or Ford Bronco.

Table 2: Percent Shoulder Belt Use by Light Truck Type and Occupant Type
(Estimates and 2 Standard Errors)

Truck Type	All Occupants	Driver	Passenger
All Trucks	55.8 (6.2)	55.3 (6.4)	56.9 (9.2)
Utility	64.1 (5.8)	61.8 (8.0)	70.3 (8.8)
Minivans	69.0 (7.2)	68.5 (7.6)	68.0 (10.2)
Other Vans	42.7 (10.4)	44.6 (10.0)	32.6 (16.4)
Compact Pickups	47.7 (9.4)	48.0 (9.2)	41.4 (15.0)
Other Pickups	47.5 (8.2)	48.4 (8.0)	45.2 (13.4)

As shown in **Table 2**, shoulder belt use differed significantly among light truck types. The highest use was by occupants of minivans, followed by utility vehicle occupants. The lowest shoulder belt use was by occupants of compact pickups, standard pickups and

standard vans. The number of passengers observed in light trucks was small for several truck types, especially other vans and compact pickups. The shoulder belt estimates for passengers in these categories have large sampling errors associated with them. Therefore, comparisons should be made with caution.

Restraint Type Results

The VINs provided information about the type of restraint system available to the occupants and whether or not an air bag was available for the driver and/or passenger. Restraint type was decoded for vehicles 11 years old or newer. Therefore, all results presented are for vehicles with model years 1985 through 1995. Restraints were classified by type for the driver and right-front passenger as follows:

- *Manual* safety belts without an air bag (restraints that require the wearer to buckle them manually).
- *Automatic* safety belts without an air bag (restraints that do not require the wearer to buckle them manually; they automatically engage when the car is started or the door is closed.)
- *Air Bag* with either manual or automatic safety belts.

Table 3 shows that drivers and passengers have the lowest rate of shoulder belt use when the belts are manually operated and no air bag is available.

Table 3: Percent Shoulder Belt Use by Restraint Type, Occupant Type and Vehicle Type
(Estimates and 2 Standard Errors)

Restraint Type	Driver		Passenger	
	Car	Light Truck	Car	Light Truck
Manual Restraint	64.1 (4.6)	56.8 (6.2)	58.7 (6.0)	55.4 (9.4)
Auto. Restraint	74.6 (3.0)	69.1 (10.0)	72.7 (5.0)	64.4 (34.2)
Air bag	71.2 (4.0)	63.6 (5.4)	71.7 (7.2)	74.0 (17.2)

Having an air bag appears to coincide with an increased use of safety belts. At the time of the survey,

about 10 percent of the driver air bag-equipped cars had automatic safety belts. Thus, based on the driver's observed use of manual belts and automatic belts, drivers with air bags could be predicted to use their belts 65 percent of the time, $(0.90 \times 64.1 + 74.6 \times 0.10)$. The survey results, though, were 6 points higher, 71 percent. Even fewer cars with passenger air bags and light trucks with driver and/or passenger air bags had automatic belts. Therefore, the air bag factor also holds true for these occupants. This may also be due to the vehicle age effect, wherein occupants of newer vehicles are more likely to use their safety belts. Vehicles with only manual belts are older, on average, than those with automatic belts or bags and, thus, would be expected to exhibit lower safety belt use rates.

Restraint Type and Age

The data collectors estimated the age of the driver and right-front passenger into five categories: *Infant* (under 1 year), *toddler* (1 to 4 years), *youth* (5 to 15 years), *young adult* (16 to 24 years), and *adult* (25 years and older). Results for children under 5 years are presented first, then results for persons 5 and older.

Occupants Under 5 Years Old

Unfortunately, the number of children observed was very small -- only 829 in passenger cars and 232 in light trucks. None of the light trucks in the survey with infants or toddlers had air bags or automatic belts, so estimates are based on children in passenger cars only. With the small sample sizes, the estimates are subject to large sampling errors. However, the patterns for infants and toddlers were similar. Restraint use was highest when a passenger air bag was present in the car. The combined child seat and belt use for children under 5 years in the front seat of cars was:

Manual Restraint	51.1% (17.4)
Automatic Restraint	62.6% (19.6)
Passenger-Side Air Bag	90.2% (20.5)

Occupants 5 years and Older

Due to a small number of light truck occupants in several age groups, the following results are for passenger car occupants only. As shown in **Table 4**, for every age-group, having an air bag on their side of the car coincided with higher belt use for drivers and passengers when compared to having manual belts alone. The largest difference was for passengers in the youth category, where belt use was only 51 percent

with manual belts compared to 72 percent when a passenger air bag was present.

Table 4: Percent Shoulder Belt Use for Passenger Car Occupants by Restraint Type and Age
(Estimates and 2 Standard Errors)

Restraint Type	5 to 15 years Passenger	16 to 24 years		25 years and older	
		Driver	Passenger	Driver	Passenger
All	61.9 (9.4)	61.4 (6.0)	51.9 (5.6)	66.2 (4.0)	65.9 (5.8)
Manual Restraint	54.1 (11.8)	57.8 (5.6)	47.1 (8.4)	62.0 (4.4)	60.9 (6.0)
Auto. Restraint	65.2 (15.2)	70.4 (5.4)	68.8 (8.2)	73.3 (4.0)	74.6 (5.0)
Air bag	71.9 (18.4)	64.9 (10.0)	57.5 (22.4)	71.6 (3.8)	73.5 (7.2)

Model Year Results

As shown in **Table 5**, shoulder belt use did differ by model year of the vehicle. Belt use was highest for car occupants of model year 1990 and 1991 cars. This result appears to be related to the requirement that all new cars have automatic restraints by the 1990 model year. Automatic restraints were mandated on both the driver side and right-front passenger side of cars as follows: 10 percent of 1987 model year cars, 25 percent of 1988 model year cars, 40 percent of 1989 model year cars and 100 percent of 1990 model year cars and beyond. Belt use dropped slightly for car occupants after the 1991 model year, possibly due to more air bags as standard equipment and fewer automatic belts. The mandated phase-in of automatic restraints for light trucks did not begin until model year 1995. Belt use for light truck occupants was highest for model years 1991 through 1994.

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Table 5: Percent Shoulder Belt Use for All Occupants by Model Year of Vehicle
(Estimates and 2 Standard Errors)

Model Year	Passenger Cars	Light Trucks
1981	47.8 (8.4)	n/a
1982	54.4 (9.2)	52.4 (21.4)
1983	55.9 (9.0)	39.5 (14.8)
1984	49.1 (5.8)	52.5 (18.6)
1985	57.2 (6.2)	41.3 (12.4)
1986	58.9 (5.2)	45.5 (16.6)
1987	64.8 (7.2)	50.4 (10.4)
1988	66.3 (4.0)	45.2 (7.4)
1989	65.3 (5.2)	47.3 (11.2)
1990	74.4 (4.8)	54.6 (12.0)
1991	74.4 (4.2)	60.9 (11.8)
1992	69.2 (5.0)	62.7 (6.0)
1993	71.6 (4.6)	60.9 (8.0)
1994	69.6 (5.0)	60.1 (12.2)
1995	69.9 (6.2)	55.6 (12.8)

For additional copies of this research note, please call (202) 366-4198 or fax your request to (202) 366-7078. For questions regarding the data reported in this research, contact Nancy Bondy [202-366-5353] or Dennis Utter [202-366-5351] of the National Center for Statistics and Analysis. This research note and other general information on highway traffic safety may be accessed by Internet users at <http://www.nhtsa.dot.gov/people/nca>.