



## Identifying Targets for Improvement in Nighttime Seat Belt Use

Previous research has found that the proportion of unbelted fatalities is greater at night than during the day. Failure to use seat belts has been identified as an important factor in nighttime fatalities, yet there are still many gaps in our knowledge about seat belt use at night. The primary objective of this project was to examine the day and night difference in seat belt use under different personal, environmental, and vehicle characteristics, in order to identify anomalies that indicate specific traffic safety problems. Differences in day and night use in primary and secondary enforcement law States were also compared, and an analysis was performed to examine day and night seat belt use in States that changed their seat belt law from secondary to primary during the 1998-2007 period.

### Method

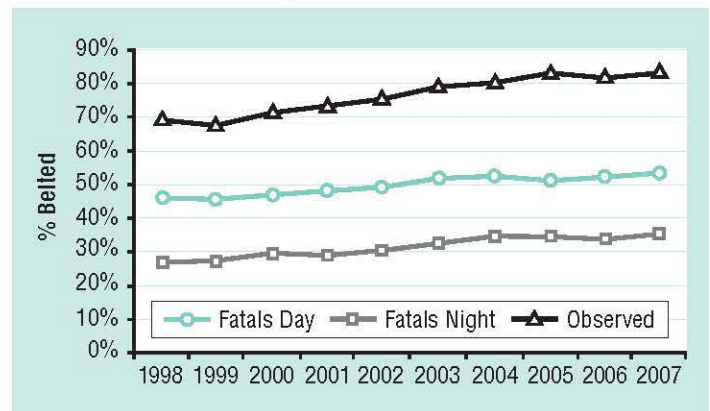
Seat belt use was tracked across years (1998-2007) and across States using data from observational surveys of daytime seat belt use and the Fatality Analysis Reporting System (FARS). Observed daytime belt use rates for States were obtained from statewide observational surveys. National seat belt use was obtained from NHTSA's National Occupant Protection Use Survey (NOPUS). FARS provided the main measure of seat belt use across day and night hours for fatally injured passenger vehicle occupants. For the purposes of this analysis, night was defined as 9 p.m. through 3:59 a.m., and day was defined as 4 a.m. through 8:59 p.m. Trends in FARS day and night belt use were examined for the 10-year period from 1998 through 2007. Relationships among observed daytime seat belt use and FARS daytime and nighttime seat belt use were examined, and FARS daytime and nighttime seat belt use were compared across gender, age, vehicle type, road type, rural/urban areas, driver record, alcohol involvement, and primary/secondary law States.

### The Nighttime Problem

For the combined 10-year period, 31% of all the passenger-vehicle related fatalities took place in crashes that occurred during the seven hours identified as nighttime in this study. According to the National Household Travel Survey conducted in 2001-2002, only 6.2% of the total daily trips were made during these hours. In each of the ten years reviewed, seat belt use among fatally injured occupants was lower at

night than during the day. On average, nighttime seat belt use was 18 percentage points lower than daytime belt use. Between 1998 and 2007, daytime seat belt use increased from 45.8% to 53.5%, an increase of nearly 8 percentage points. During the same 10-year period, nighttime seat belt use increased from 26.3% to 35.0%, an increase of nearly 9 percentage points. The figure below illustrates the parallel increase in belt use for observed daytime use, daytime use by fatally injured occupants, and nighttime use by fatally injured occupants.

**Trends in Seat Belt Use, 1998-2007**



**Fatals Day** = daytime fatally injured front-seat occupants in passenger vehicles (FARS). **Fatals Night** = nighttime fatally injured front-seat occupants in passenger vehicles (FARS). **Observed** = daytime observed seat belt use (NOPUS).

### Relationships With Daytime Observational Surveys

Correlations between State daytime observational seat belt use rates and seat belt use among fatally injured occupants were computed over the 10 years of data. States with high observed seat belt use tended to have higher seat belt use rates in fatal crashes at all times (day, night, and overall). The correlations between observed seat belt use and FARS seat belt use were 0.67 for nighttime, 0.72 for daytime, and 0.75 overall.

### Targets for Improvement in Nighttime Seat Belt Use

First, daytime and nighttime seat belt use rates for all fatally injured outboard front-seat occupants were compared by vari-



ous categories describing gender, age, location of the crash, roadway type, and type of vehicle involved. These data were based on three years of FARS data (2005 to 2007). The groups with low FARS nighttime use were males (31%), those under 45 years old (33%), SUV/van drivers and passengers (30%), secondary law States (26%), rural locations (31%), collector and local roads (27%), and lowest of all, pickup truck occupants (22%). These categories also showed the lowest daytime use.

However, the categories that showed the greatest difference in FARS belt use from day to night were those 45 and older (61% day, 42% night), those on interstate/arterial roads (58% day, 41% night), and occupants of cars (59% day, 41% night).

A second regression analysis was computed for variables unique to drivers. Overall FARS seat belt use percentages were lowest in drivers who were likely accountable for the crash, those with previous suspension(s) or with other previous moving violation(s). Drivers with crashes or violations on their records had low FARS belt use during the day (38%) and at night (27%). Drivers with clean records had a larger disparity in FARS seat belt use from daytime to nighttime (53% to 29%).

### FARS Daytime and Nighttime Seat Belt Use by Driver BAC, 2003-2007

BAC Subgroup*	Day (4 a.m.–8:59 p.m.)	Night (9 p.m.–3:59 a.m.)	Day-Night Difference
0	59.5% (N=19,454)	52.5% (N=3,618)	+7.0
.01 g/dL or above	31.4% (N=6,528)	27.2% (N=8,600)	+4.2
.08 or above	27.7% (N=5,349)	26.1% (N=7,855)	+1.6

\* Based on actual BAC results from States with an average percentage tested of at least 80% over the period 1998-2007

A third regression analysis was computed for 28 States that reported chemical test results in at least 80% of cases (averaged over 1998-2007) to examine the role of alcohol in daytime and nighttime seat belt use.<sup>1</sup> Seat belt use was compared across zero blood alcohol concentration (BAC), any positive BAC, and BACs of .08 g/dL or higher. As shown in the table below, FARS seat belt use was much higher among zero-BAC drivers, both night and day, compared to drivers with positive BACs. This was especially true for drivers with BACs of .08 g/dL and higher. The day-night difference was small for

<sup>1</sup> Since time of day is one of the variables used to determine imputed alcohol levels in FARS, actual BAC results were used to determine alcohol involvement in fatal crashes.



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alcohol-impaired drivers (BAC ≥ .08), who had relatively low FARS belt use rates both day (27.7%) and night (26.1%).

### Effect of Primary Laws on Nighttime Seat Belt Use

Over the 10-year period, nighttime seat belt use among fatally injured occupants was substantially lower than daytime use by an average of nearly 18 percentage points for primary States (56.4% day, 38.5% night) and nearly 19 percentage points for secondary States (42.2% day, 23.6% night). The impact of changing the seat belt law from secondary to primary showed that FARS seat belt use was higher after the law than it was prior to the upgrade in law for both daytime seat belt use (pre-to-post change of 45.5% to 55.7%) and nighttime seat belt use (pre-to-post change of 26.3% to 37.2%).

### Summary

Study results confirmed that night seat belt use is lower than daytime use, but by a much wider margin than has been found in previous observational studies. Although there were increases over the 10-year period in both daytime and nighttime seat belt use, there was a consistent day-night disparity in FARS belt use over the years 1998 to 2007.

The study results revealed targets for improving nighttime seat belt use. Alcohol-impaired drivers are a particularly important target because they have illustrated a main reason why crash rates are higher during nighttime hours and seat belt use lower. Drivers with illegal BACs comprised more than two-thirds of fatally injured drivers killed at night, and only 26% of these drivers were belted at night.

The regression analyses allowed a thorough investigation of differences in the day/night disparities for various categories. For example, the groups that tended to show the greatest gap in belt use from day to night were: occupants 45 and older, those on interstate roads, car occupants, and drivers with clean records. This finding suggests that efforts to increase night seat belt use that focus on a broad audience that includes both traditionally low-use groups (e.g., pickup truck occupants) and relatively high-use groups (e.g., 45 and older) might be productive.

### How to Order

To order *Daytime and Nighttime Seat Belt Use by Fatally Injured Passenger Vehicle Occupants* (48 pages), prepared by Preusser Research Group, write to the Office of Behavioral Safety Research, NHTSA, NTI-130, 1200 New Jersey Avenue SE., Washington, DC 20590, fax 202-366-7394, or download from [www.nhtsa.gov](http://www.nhtsa.gov). Angela Eichelberger, Ph.D., was the project manager.

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