Daytime and Nighttime Seat Belt Use by Fatally Injured Passenger Vehicle Occupants

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The difference in day and night seat belt use among fatally injured passenger vehicle occupants was investigated by personal, environmental, and vehicle characteristics. In each of the 10 years reviewed, seat belt use among fatally injured occupants was lower at night (9 p.m.-3:59 a.m.) than during the day. On average, nighttime use was 18 percentage points lower than daytime belt use. Results indicated that groups with lower seat belt use *both* day and night were: males; younger occupants; pickup truck occupants; residents of secondary enforcement law States; occupants traveling in rural areas; occupants killed on local roads; occupants killed on weekends; drivers with crashes and violations on their records; drivers likely accountable in the crash; and drivers with high blood alcohol concentrations. Alcohol-impaired drivers comprised more than two-thirds of fatally injured drivers killed at night, and only 26% of these drivers were belted at night. The categories of fatally injured occupants who showed the greatest *discrepancy* in day and night seat belt use included: occupants 45 and older, those on interstate roads, car occupants, and drivers with clean records.

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BACKGROUND

The disproportionate contribution of nighttime fatalities to the highway death toll has long been recognized. It is becoming increasingly clear that one of the reasons for this situation is that seat belts are less often used during nighttime hours. There are still many gaps in our knowledge about seat belt use at night. The lack of detailed information about nighttime and daytime seat belt use is limiting in two ways: (1) it does not allow identification of specific low-seat-belt-use targets, and (2) it is still unclear why seat belt use is lower at night. A better understanding of night seat belt use compared with daytime use can lead to more focused efforts in targeting relevant populations.

OBJECTIVES

Currently, States only have daytime observational surveys available and do not know the prevailing use rate at night. It is thus of interest to determine the relationship between observed daytime use rates and daytime and nighttime rates of seat belt use in fatally injured occupants. A major part of the study involves investigation of the differential relationship between day and night seat belt use in fatalities by rural/urban location, vehicle types, road type, and occupant age and gender. Also of interest is day and night seat belt use in fatalities by blood alcohol concentration (BAC), driver record, and driver-related factors that indicate the driver was likely accountable for the crash. Differences in day and night use in primary and secondary States were compared, and an analysis was done of States that changed from secondary to primary status in the 1998-2007 period.

METHODS

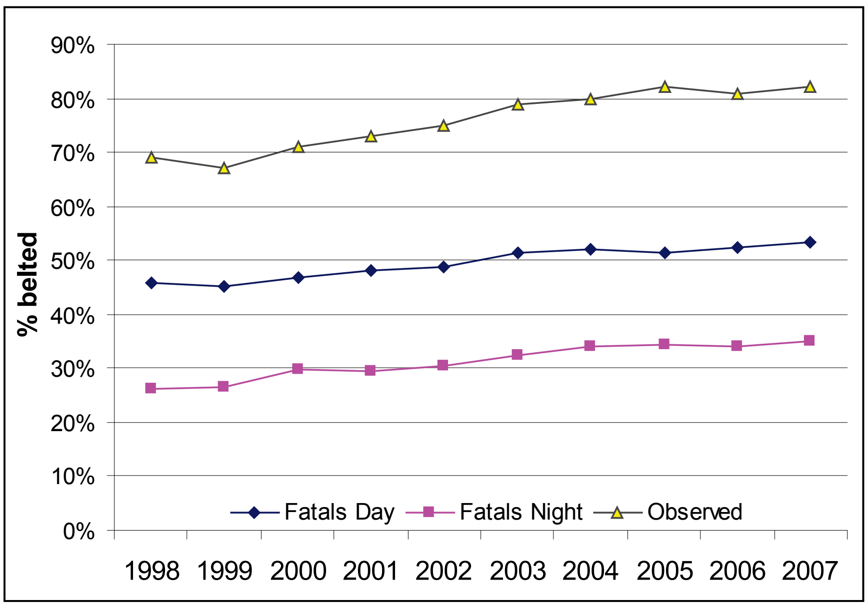
Observational surveys of seat belt use were used to track belt use across years and across States. Data obtained from the Fatality Analysis Reporting System (FARS) provided the main measure of seat belt use across day and night hours. These two sets of data allowed for comparison between observed daytime seat belt use and seat belt use in fatally injured occupants in both daytime and nighttime. Daytime and nighttime seat belt use were also compared across gender, age, vehicle type, road type, rural/urban areas, driver record, alcohol involvement, and between primary and secondary law jurisdictions. Trends were examined for the 10-year period from 1998 to 2007.

RESULTS

Basic Data and Trends

In each of the 10 years reviewed, seat belt use among fatally injured occupants was lower at night than during the day. The difference between nighttime and daytime seat belt use rates ranged from 17.0 to 19.5 percentage points, clustering around 18 percentage points. Daytime and nighttime rates increased between 1998 and 2007, with an increase of 7.7 percentage points for daytime use and 8.7 percentage points for nighttime use. The figure below illustrates the parallel increase in belt use shown in 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 Survey Results

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 Improvements in Nighttime Seat Belt Use

First, daytime and nighttime seat belt use rates for all fatally injured outboard front-seat occupants were compared by various categories describing gender, age, location of the crash, roadway type, and type of vehicle involved. These data were based on 3 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 age 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, with previous suspensions, or with other moving violations. 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%).

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.[1] Seat belt use was compared across zero BAC, any positive BAC, and BACs of .08 g/dL and more. 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 a positive BAC. This was especially true for drivers with a BAC of .08 g/dL and above. The day-night difference was small for alcohol-impaired drivers (BAC ≥ .08 g/dL), who had relatively low FARS belt use rates both day (27.7%) and night (26.1%).

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 g/dL or above	27.7% *(N=5,349)*	26.1% *(N=7,855)*	+1.6

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

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

[1] 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. Note that the results using BAC data are not necessarily representative of the Nation as a whole, because this analysis was based on 28 States.

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%).

DISCUSSION

This study investigated the day/night difference in seat belt use among fatally injured drivers and passengers, by personal, environmental, and vehicle characteristics. Study results confirmed that night seat belt use is lower than daytime use among the fatally injured, but by a much wider margin than has been found in observational studies. The day-night differential averaged about 18 percentage points from 1998 to 2007, although there were increases over this period in both daytime and nighttime seat belt use. The increase in seat belt use shown in the FARS data parallels the increase in seat belt use found in daytime observations.

Nighttime and daytime seat belt use in the fatally injured population were compared by age, gender, vehicle type, primary/secondary seat belt law, rural/urban, road type, weekday/weekend, driver record, likely accountable status, and alcohol use. In these comparisons, groups with lower seat belt use both day and night were males, younger occupants, pickup truck occupants, residents of secondary States, occupants traveling in rural areas, occupants killed on local roads, occupants killed on weekends, drivers with crashes and violations on their records, drivers likely accountable in the crashes, and drivers with high blood alcohol concentrations.

The regression analyses allowed a thorough investigation of the day/night disparities in FARS seat belt use for the various categories. Many of the interactions appeared to have little practical significance; however, the analysis did reveal some anomalies that may account for some of the differences in day and night seat belt use. For example, greater nighttime/daytime differences tended to occur in the traditionally higher belt use groups: occupants 45 and older, occupants on interstate roads, car occupants, and drivers with clean records. These groups showed the greatest difference in belt use from day to night. It is unclear why belt use was lower at night than during the day for these groups, but this finding suggests that efforts to increase night seat belt use that focus on a broad audience that includes traditionally low-use groups (e.g., pickup truck occupants) and relatively high use groups (e.g., 45 and older) might be productive.

The analysis revealed that there are several groups with particularly low FARS nighttime seat belt use that can be targeted for special attention. These groups include alcohol-impaired drivers (nighttime belt use 26%), pickup truck occupants (22%), rural locations (31%), and residents of secondary enforcement States (26%). Alcohol-impaired drivers are a particularly important target. This group illustrates a main reason why crash rates are higher during nighttime hours and seat belt use is lower. In the 28-State sample that had good reporting of chemical test data, drivers with illegal blood alcohol concentrations were more likely to be fatally injured at night, comprising more than two-thirds (68%) of fatally injured drivers killed between 9 p.m. and 3:59 a.m. At other hours, alcohol-impaired drivers comprised 22% of all those killed in crashes. Interestingly, this is one group whose seat belt use during the daytime (28%) was not markedly higher than at night (26%). Thus a large part of the disparity in day/night seat belt use is due to the greater numbers of unbelted alcohol-impaired drivers at night.

Pickup truck occupants had the lowest nighttime FARS seat belt use of any of the groups studied and also had low daytime use. Both pickup truck occupants and rural residents have been targeted as consistently low belt use populations, and special high visibility enforcement programs have been designed to increase their seat belt use. The programs have had some success and could be expanded to include nighttime enforcement as well.

States with primary enforcement of seat belt laws had higher FARS belt use both day and night than did States with secondary laws. Both primary and secondary States had lower belt use at night than during the day. Over the study period, there was an increasing trend for differences between primary and secondary States in belt use, particularly for nighttime seat belt use; in 2007, the latest year available, nighttime use was 14.9 percentage points higher in primary (40.5%) than in secondary law States (25.6%). This makes nighttime seat belt use of particular concern in secondary law States.

In summary, the present study indicates that, based on seat belt use among fatally injured occupants, nighttime seat belt use is a problem, averaging 18 percentage points lower than during the daytime in the past 10 years. In large part, this is a problem involving alcohol-impaired drivers. Nighttime seat belt enforcement programs have shown potential, although they have been few in number and there is still a need to determine the most effective ways to combine enforcement and publicity during nighttime hours.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

I. Introduction

The disproportionate contribution of nighttime fatalities to the highway death toll has long been recognized. It is becoming increasingly clear that one of the reasons for this situation is that seat belts are less often used during nighttime hours. Used properly, seat belts reduce the risk of fatal injury to front-seat passenger vehicle occupants by 45% and the risk of moderate to severe injury by 50% (Kahane, 2000).

Most of our knowledge about seat belt use comes from State and national observational surveys undertaken each year. These surveys are useful for tracking progress in increasing seat belt use. However, they may be insufficient for representing certain drivers, such as the nighttime population; moreover, they do not adequately tap into the population that most needs the protection provided by seat belts: drivers likely to be in serious crashes. This situation exists because the surveys are done in high-density areas during daylight hours. Rural areas have higher fatal crash rates than urban areas, and fatal crash rates per mile driven are substantially higher at night than during the day for drivers of all ages (Ferguson et al., 2007). Nighttime and rural populations include disproportionate numbers of drivers likely to be in serious crashes, and it is known that such drivers are less likely to use seat belts and to buckle up in response to laws (Williams & O'Neill, 1979; Fisher, 1980; Jonah & Lawson, 1984; Williams, Wells, & Lund, 1986; Preusser et al., 1988). Indeed, seat belt use is lower in rural than in urban areas (NHTSA, 2008), as well as being lower at night. Both rural areas and nighttime hours are receiving attention in current efforts to increase seat belt use and reduce fatalities.

Nighttime Seat Belt Use

There are still many gaps in our knowledge about seat belt use at night. A better understanding of night seat belt use compared with daytime use can lead to more focused efforts in targeting relevant populations. The present study was designed to provide a thorough analysis of nighttime seat belt use based on use among fatally injured passenger vehicle occupants. Seat belt use in this population is indicative of use rates in potentially fatal crashes, the situations in which seat belts are most important (Nichols & Ledingham, 2008).

We do have some rudimentary knowledge about nighttime seat belt use. Much of this information comes from observational surveys, although not many have been undertaken during the nighttime hours. The obvious difficulty in conducting surveys at night is that darkness makes it more difficult to accurately identify whether or not a shoulder seat belt is in use. The vision problem in identifying seat belt use at night has been addressed in recent years through the use of night vision goggles and infrared spotlights, technology now commercially available (Chaudhary & Preusser, 2006). This has led to several new studies of nighttime seat belt use. Without this technology, observation sites are limited to well-lit locations, and that in turn potentially affects the comparison of nighttime and daytime use rates. Using the technology makes it possible to replicate daytime seat belt use surveys, using the same sites. However, this approach provides true comparisons of night and day use in a State only if the distribution of traffic as a function of urban/rural, county, and roadway functional class is proportionately equivalent during day and night, which it is not. One way in which this can be controlled is by weighting the data based on specific 24-hour traffic counts (i.e. using nighttime traffic counts only), as reported in Chaudhary and Preusser (2006). However such counts are not always available on an hourly basis. A recently released NHTSA report provides additional guidance to States for estimating nighttime seat belt use using either 24-hour or hourly traffic counts (Chaudhary, Leaf, Preusser, & Casanova, 2010).

What is clear from observational surveys is that seat belt use at night is consistently lower than during the day. Most of the studies are recent, based on whole States or jurisdictions within States, using night vision goggles and infrared spotlights (Chaudhary, Tison, & Casanova, 2010; Chaudhary & Preusser, 2006; Chaudhary, Alonge, & Preusser, 2005; Solomon, Chaudhary, & Preusser, 2007; Vivoda et al., 2006). Three older studies were based on unaided visual observations at locations with sufficient lighting (Williams & O'Neill, 1979; Preusser, Williams, & Lund, 1986; Wells, Preusser, & Williams, 1992). All studies were done in jurisdictions with seat belt use laws. Results are summarized in Table 1.

Table 1. Observed Seat Belt Use Rates: Day Versus Night

Location	Year	% Belted Day	% Belted Night
Toronto, ON Ottawa, ON Windsor, ON Vancouver, BC	1978	49%	35%
Binghamton, NY	1988	46%	35%
Southeast NY	1985	43%	36%
Connecticut	2004	83%	76%
Reading, PA	2004	56%	50%
Bethlehem, PA	2004	69%	64%
New Mexico	2005	87%	80%
Indiana	2005	80%	79%
Maine	2008	79%	69%

Although seat belt use is known to be lower at night, there is still limited information on seat belt use in various nighttime subpopulations, compared with their daytime use. There is some information comparing day and night seat belt use by gender, vehicle type, and other factors, but some of the available information is inconsistent. In Connecticut, for example, nighttime seat belt use was substantially lower than daytime use in urban areas, but this was not the case in rural areas (Chaudhary & Preusser, 2006). In New Mexico, no such differences were found, possibly because what is considered urban and rural in these two States differs (Solomon, Chaudhary, & Preusser, 2007).

The lack of detailed information about nighttime and daytime seat belt use is limiting in two ways. It does not allow identification of specific targets of interest that have especially low seat belt use, nor does it provide information that would help sort out why seat belt use is lower at night. It has been speculated that the same people are less likely to buckle up at night because detection of nonuse by the police is more challenging when it is dark. The extent to which this is true is not established. The only known study in which the same people were observed both in daylight and in darkness was limited to teenagers going to school in the morning and attending a football game at night, and the results are not clear-cut (Williams, McCartt, & Geary, 2003). Sixty-six percent were consistent in their seat belt use, but 19% were belted in the morning but not at night. However, 16% who were not belted in the morning buckled up at night.

If it were the case that the same people buckle up during the day but not at night, a generalized nighttime enforcement programs would be called for as a strategy. However, the primary reason for the night versus day difference is likely to be that there are different populations on the roads at these times. That is, the difference may be due to disproportionate numbers of lower-use groups present at night, in which case the goal is to identify these groups for special targeting. Given sufficient information on subpopulations present during nighttime and daytime periods, and their seat belt use, this can be investigated.

Alcohol-Positive Drivers

Alcohol-positive drivers are one important group known to contribute to lower seat belt use at night. They are more frequently on the roads at night than during the day, they have especially low use, and they have been found to be less responsive to seat belt use laws than other populations of drivers. Roadside surveys in Ontario found that 62% of drivers with zero or very low BACs used seat belts but only 36% of drivers with high BACs did so (Ministry of Transportation and Communications, 1979). Similarly wide differentials were found in British Columbia, Saskatchewan, and Quebec (Lawson et al., 1982). In Ottawa, seat belt use was 82% during daytime, and 61% among those leaving bars (Grant, 1991). In Halifax, daytime use was 86% compared with 54% for bar patrons (Malenfant & Van Houten, 1988). In the study of bar patrons in southeastern New York counties, where daytime seat belt use was 43% and nighttime use 36%, seat belt use among those leaving nearby bars was 24%. Further, bar patrons had substantially inferior driving records compared with the other observed drivers, confirming their high-risk status (Preusser, Williams, & Lund, 1986).

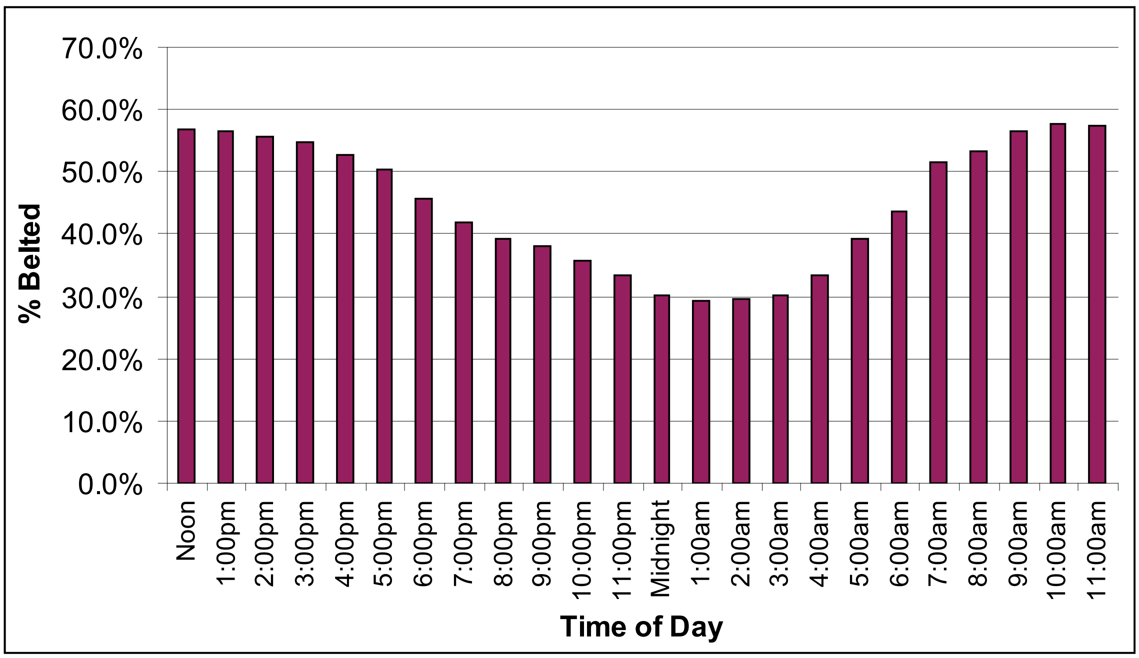
Night and Day Seat Belt Use in Crash Populations

There is scattered evidence about night and day differences in seat belt use in the crash population. Some information has been based on seriously injured occupants using State data files (Kim & Kim, 2003), but most comes from FARS, looking at seat belt use among fatally injured occupants, which is the population to be addressed in the present study (e.g., Chaudhary & Preusser, 2006; Salzberg et al., 2002; Tison & Williams, 2010). It is known from the latter studies that seat belt use in crash populations is higher during the day than at night and that it has increased over time, but there has not been a detailed look at night versus day seat belt use among fatally injured occupants over a span of years.

There are advantages in basing seat belt use information on the fatally injured population. There is no issue concerning the comparability of nighttime and daytime use, as there is in observational studies because of different sites used, or because of different traffic patterns at the same site. The information is collected systematically across States with identical procedures for both day and night crash events. The accuracy of seat belt use information is thought to be good, since in most cases there is definitive physical or medical evidence of use. Also, there is information across all 24 hours of the day, providing a clear picture of the hour-by-hour variation. In the observational data displayed in Table 1, the hours of nighttime and daytime are defined in different ways in different studies, affecting comparability across studies.

Figure 1 shows seat belt use among fatally injured occupants for all 24 hours of the day, based on 2000-2007 FARS. Notably, seat belt use in the fatally injured population is much lower than observed use in the general traffic stream. This is so because high-risk drivers are less inclined to use seat belts, and because seat belts protect against fatal injuries, so that those who are killed are more likely to be unbelted.

Figure 1. Seat Belt Use by Time of Day (FARS, 2000-2007)



In the fatally injured population, mid-day use is highest, and the lowest use is from midnight to 2 a.m. The studies using night vision goggles and infrared spotlights to identify seat belt use have defined nighttime as 9 p.m. to 3:59 a.m., and that is the choice in the present study. As defined, each hour of the nighttime period has lower use than any daytime hour.

Study Questions

There are several questions to be addressed. As background, seat belt use among fatally injured occupants – daytime and nighttime – were calculated separately for drivers and right-front passengers over a 10-year period (1998-2007). Trends in use rates were assessed, and night and day rates among fatally injured occupants were compared with national trends in daytime use rates based on observations from NHTSA's National Occupant Protection Use Survey (NOPUS).

Currently, States only have daytime surveys available and do not know the prevailing use rate at night. Therefore, it was of interest to determine the relationship between observed daytime use rates and daytime and nighttime rates of seat belt use in fatal crashes. In addition, the present study examined the extent to which observed daytime use rates were related to day and night fatalities.

A major part of the study involved investigation of the differential relationship between day and night seat belt use in fatalities by rural/urban location, vehicle types, road type, and occupant age and gender, all of which were based on all front-seat occupants. This study also investigated day and night seat belt use among fatally injured drivers by BAC, driver record, and likely accountable status. Such a strategy identifies whether differences in seat belt use for various groups (e.g., urban versus rural location) are the same or similar during nighttime as they are during the day. This study identifies populations who have particularly low seat belt use at night. The study investigates the effect of different populations in accounting for night and day differences in seat belt use. That is, exploration of whether lower use groups comprise a larger proportion of the nighttime population, compared with their presence during the day will be possible.

There is evidence that special nighttime enforcement programs can increase seat belt use at night (Solomon, Chaffe, & Preusser, 2009; Wells, Preusser, & Williams, 1992; Chaudhary, Alonge, & Preusser, 2005; Malenfant & Van Houten, 1988), and mixed evidence as to whether daytime enforcement programs increase seat belt use at night as well as during the day (Chaudhary & Preusser, 2006; Grant, 1991; Vivoda et al., 2006; Chaudhary et al., 2010). The effect of enforcement programs on nighttime seat belt use is not part of the present study, but their potential effects will be discussed later in the context of identifying specific targets for such programs.

In terms of increasing seat belt use at night, there is growing evidence that primary/secondary enforcement status of laws can have a significant effect on seat belt use at night. Two studies have found evidence suggesting that switching from secondary to primary enforcement status has more effect on nighttime use than daytime use. In one study based on seat belt use among fatally injured occupants, both day and nighttime seat belt use increased in five of the six States studied, after accounting for preexisting secular trends (Masten, 2007). However, in three of the five States, the increases were greater at night. In Maine, which converted to primary status in 2007, there was a subsequent increase of 3 percentage points during the day, and 11 percentage points at night, based on observational surveys (Chaudhary et al., 2010). In the present study, differences in day and night use in primary and secondary States were compared, and an analysis was done of States that changed from secondary to primary status in the 1998-2007 period.

II. Evaluation Methods

Seat belt use was tracked across years and across States using data from observational surveys of daytime seat belt use and FARS, which provided the main measure of seat belt use across day and night hours. These two sets of data allowed for comparison between observed daytime seat belt use and seat belt use in fatally injured occupants in both daytime and nighttime. Daytime and nighttime seat belt use were also compared across gender, age, vehicle type, road type, rural/urban areas, driver record, alcohol involvement, and between primary and secondary law jurisdictions. Trends were examined for the 10-year period 1998 to 2007.

Observational Surveys of Seat Belt Use

Over the period of interest, nearly every State conducted and reported on statewide surveys of seat belt use. These surveys generally followed NHTSA guidelines for conducting statewide surveys. These guidelines require that: (1) States have a probability-based survey design, (2) data be collected from direct observation of seat belt use, (3) the relative error of the seat belt use estimate not to exceed 5%, (4) counties or other primary sampling units totaling at least 85% of the State's population be eligible for inclusion in the sample, and (5) all daylight hours for days of week be eligible for inclusion in the sample. National seat belt use measures come from NOPUS, a probability-based observational survey conducted annually by NHTSA's National Center for Statistics and Analysis. NOPUS is considered the most reliable measure of national belt use. Observational surveys of seat belt use were:

- Compared across years; and
- Correlated with daytime and nighttime belt use in fatally injured occupants of passenger vehicles.

FARS belt use rates are typically much lower than observed belt use rates. This is, in part, a result of the FARS belt use rate being based on crashes that involved at least one fatally injured occupant. FARS belt use rates are lower than observed belt use because unbelted occupants are more likely to die in potentially fatal crashes. The discrepancy between observed belt use and belt use in fatally injured is even greater in States with high observed belt use.

Fatality Analysis Reporting System (FARS)

Rates of belt use among fatally injured front-seat passenger vehicle occupants (daytime versus nighttime) were used as the principal estimate of seat belt use and were compared to observed belt use rates. FARS data was used to identify day and night changes in seat belt use over the period 1998 to 2007. FARS data was also used in the following fashion:

- To compare daytime and nighttime seat belt use in both drivers and passengers;
- To explore the relations among statewide observed daytime seat belt use rates and daytime and nighttime seat belt use rates in fatally injured occupants;

- To explore the relations among observed daytime seat belt use rates and fatality rates;
- To identify targets for improvement; and
- To explore the impact of primary versus secondary law on daytime and nighttime seat belt use.

FARS data were used to examine differences in the proportion of belted fatalities in daytime versus nighttime. Nighttime hours were defined as the 7 hours between 9 p.m. and 3:59 a.m., a time period in which most daytime activities are either completed or have not yet started. The start time of 9 p.m. was selected because it is dark most of the year and most typical daytime activities (e.g., work) have ceased. The 4 a.m. hour, not included in the definition of nighttime, is a transition hour where most people out socializing the night before are likely to be home and some people may be starting their commutes to work. Nationally, belt use among fatally injured occupants of passenger vehicles is lowest from midnight through 3:59 a.m. and next lowest from 9 p.m. to midnight (see Figure 1). Thus these hours contain high-risk drivers engaged in typical nighttime activities.

A set of binary logistic regressions were conducted to identify predictors of belt use and compare those predictors across time of day (i.e., day versus night). The regressions explored the impact of gender, age, road type, rural/urban areas, vehicle type, and law type on seat belt use in fatally injured occupants of passenger vehicles. Belt use by fatally injured drivers was also explored looking at factors unique to drivers such as driver record, classification as likely accountable or not in the crash, as well as alcohol involvement. Significance level was set at $p \leq .001$ for all binary regressions.

III. Results

The results are divided into four sections: basic data and trends; relationships with daytime observational survey results; targets for improvements in nighttime seat belt use; and effect of primary laws on nighttime seat belt use.

The 7 hours identified as nighttime in this study (9 p.m. - 3:59 a.m.) represent 29% of all hours of the day. For the combined 10-year period, 31% of all the passenger-vehicle related fatalities took place in crashes that occurred during these hours. The overrepresentation of nighttime fatalities is particularly impressive since, according to the most recent National Household Travel Survey conducted in 2001-2002 (Bureau of Transportation Statistics), only 6.2% of the total daily trips were made between 9 p.m. and 3:59 a.m.

Basic Data and Trends

Table 2 displays 10-year national trends in daytime and nighttime seat belt use by fatally injured front-seat occupants of passenger vehicles. In each of the 10 years, nighttime seat belt use rates were lower than daytime rates. The difference in night and day FARS belt use clustered around 18 percentage points, ranging from 17.0 to 19.5 percentage points. Between 1998 and 2007, daytime and nighttime FARS belt use rates increased by 7.7 percentage points and 8.7 percentage points, respectively. The percentage increase in seat belt use from 1998 to 2007 was higher for nighttime (33.1%) than daytime (16.8%) belt use. This was due to a lower baseline for nighttime belt use. Computing a "conversion" rate (percentage of non-users "converted" to users; current belt use minus baseline belt use, divided by 100% minus baseline) takes away this advantage, giving more credit to approaching 100%. Conversion rates from 1998 to 2007 were slightly lower for nighttime (11.8%) than daytime (14.2%) rates.

Table 3 shows FARS seat belt use data separately for drivers and right-front passengers. Right-front passengers comprised 20.6% of the sample of front-seat occupant deaths. As Table 3 indicates, FARS seat belt use by passengers was slightly higher than for drivers, contrary to what is found in observational surveys (NHTSA, 2008). Similar day/night differences were found for drivers and passengers, and seat belt use for both day and night fatally injured occupants increased from 1998 to 2005, the increases being slightly greater for passengers for both day (+8.1 percentage points for passengers, +7.8 percentage points for drivers) and night seat belt use (+10.1 percentage points for passengers, +8.4 percentage points for drivers).

Table 2. Seat Belt Use by Fatally Injured Occupants, FARS 1998-2007

Year	Day (4 a.m. - 8:59p.m.)	Night (9 p.m. - 3:59 a.m.)	Day-Night Difference
1998	45.8% *(N=17,822)*	26.3% *(N=7,095)*	+19.5
1999	45.2% *(N=18,001)*	26.5% *(N=7,117)*	+18.8
2000	46.8% *(N=17,809)*	29.8% *(N=7,376)*	+17.0
2001	48.1% *(N=17,868)*	29.3% *(N=7,387)*	+18.7
2002	48.7% *(N=18,134)*	30.4% *(N=7,801)*	+18.3
2003	51.3% *(N=18,129)*	32.3% *(N=7,375)*	+19.0
2004	52.0% *(N=18,045)*	34.0% *(N=7,338)*	+17.9
2005	51.5% *(N=17,790)*	34.3% *(N=7,438)*	+17.2
2006	52.3% *(N=17,089)*	34.1% *(N=7,462)*	+18.2
2007	53.5% *(N=15,885)*	35.0% *(N=7,142)*	+18.5

Note: Based on the number of fatally injured front-seat occupants who were wearing seat belts in passenger vehicles.

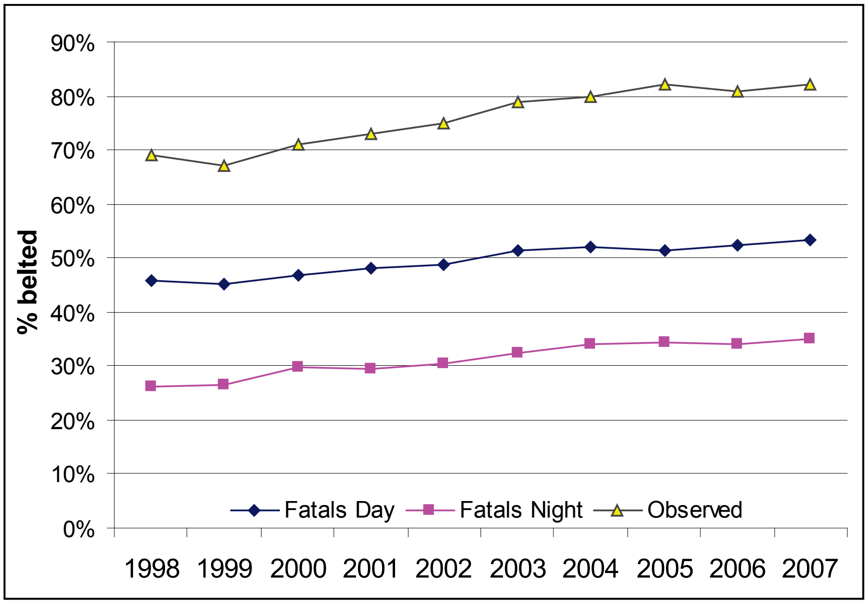
Table 3. Seat Belt Use by Fatally Injured Drivers and Passengers, FARS 1998-2007

	Drivers			Passengers		
Year	Day	Night	Day-Night Difference	Day	Night	Day-Night Difference
1998	44.9% *(N=13,975)*	25.7% *(N=5,612)*	+19.2	48.8% *(N=3,847)*	28.4% *(N=1,483)*	+20.5
1999	44.2% *(N=14,273)*	25.8% *(N=5,564)*	+18.4	49.2% *(N=3,728)*	28.9% *(N=1,552)*	+20.4
2000	46.0% *(N=14,007)*	28.8% *(N=5,761)*	+17.2	49.8% *(N=3,801)*	33.3% *(N=1,615)*	+16.5
2001	47.6% *(N=14,204)*	29.3% *(N=5,728)*	+18.3	49.7% *(N=3,664)*	29.4% *(N=1,658)*	+20.3
2002	47.8% *(N=14,441)*	29.3% *(N=6,092)*	+18.4	52.2% *(N=3,692)*	34.2% *(N=1,708)*	+18.0
2003	50.5% *(N=14,408)*	31.9% *(N=5,801)*	+18.6	54.5% *(N=3,721)*	33.9% *(N=1,573)*	+20.6
2004	51.5% *(N=14,428)*	33.3% *(N=5,781)*	+18.2	53.7% *(N=3,617)*	36.9% *(N=1,557)*	+16.9
2005	50.8% *(N=14,278)*	33.2% *(N=5,944)*	+17.6	54.6% *(N=3,511)*	38.6% *(N=1,494)*	+16.0
2006	51.3% *(N=13,825)*	33.0% *(N=5,959)*	+18.3	56.3% *(N=3,264)*	38.4% *(N=1,503)*	+17.9
2007	52.7% *(N=12,911)*	34.1% *(N=5,674)*	+18.6	56.9% *(N=2,973)*	38.5% *(N=1,468)*	+18.4

Note: Based on the number of fatally injured front-seat occupants who were wearing seat belts in passenger vehicles.

In Figure 2, changes in observed use, based on NOPUS, are compared with use by fatally injured occupants, day and night, illustrating the parallel increases that occurred in all three series between 1998 and 2007.

Figure 2. 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)

Table 4 shows State differences in daytime and nighttime seat belt use, and day/night differences, for 1998 compared with 2007 (data for all years are presented in Appendix A). Numbers in some of the less populous States are small, which can exaggerate differences and makes numerical comparisons of dubious value. However, it can be seen that there is great variation in seat belt use rates in both night and day, substantial variation in night/day differentials, and in 1998-2007 changes.

Table 4. Seat Belt Use by Fatally Injured Occupants by State, FARS 1998 & 2007

	1998			2007		
State	**Day**	**Night**	**Day-Night Difference**	**Day**	**Night**	**Day-Night Difference**
ALABAMA	33.0%	21.0%	+12.0	45.6%	27.2%	+18.4
	(N=581)	*(N=195)*		*(N=564)*	*(N=217)*	
ALASKA	58.6%	13.3%	+45.3	58.1%	50.0%	+8.1
	(N=29)	*(N=15)*		*(N=31)*	*(N=14)*	
ARIZONA	37.3%	19.1%	+18.2	44.7%	31.1%	+13.6
	(N=378)	*(N=115)*		*(N=347)*	*(N=132)*	
ARKANSAS	33.2%	17.1%	+16.2	42.2%	20.4%	+21.8
	(N=325)	*(N=82)*		*(N=282)*	*(N=93)*	
CALIFORNIA	65.6%	47.5%	+18.1	71.4%	57.9%	+13.5
	(N=1,207)	*(N=469)*		*(N=1,283)*	*(N=632)*	
COLORADO	44.4%	25.3%	+19.2	52.8%	26.2%	+26.6
	(N=286)	*(N=99)*		*(N=212)*	*(N=84)*	
CONNECTICUT	38.5%	17.0%	+21.5	53.3%	54.0%	-0.7
	(N=130)	*(N=53)*		*(N=92)*	*(N=63)*	
DELAWARE	45.9%	13.3%	+32.6	62.2%	56.7%	+5.5
	(N=61)	*(N=15)*		*(N=37)*	*(N=30)*	
DISTRICT OF COLUMBIA	44.4%	27.3%	+17.2	50.0%	60.0%	-10.0
	(N=9)	*(N=11)*		*(N=8)*	*(N=5)*	
FLORIDA	45.7%	22.3%	+23.4	49.6%	31.3%	+18.3
	(N=1,214)	*(N=439)*		*(N=948)*	*(N=572)*	
GEORGIA	52.9%	22.4%	+30.6	48.4%	29.7%	+18.7
	(N=699)	*(N=228)*		*(N=727)*	*(N=256)*	
HAWAII	81.3%	48.0%	+33.3	68.0%	53.6%	+14.4
	(N=32)	*(N=25)*		*(N=25)*	*(N=28)*	
IDAHO	33.3%	21.4%	+11.9	53.8%	16.2%	+37.6
	(N=135)	*(N=42)*		*(N=104)*	*(N=37)*	
ILLINOIS	44.4%	25.7%	+18.7	56.2%	35.4%	+20.8
	(N=471)	*(N=226)*		*(N=434)*	*(N=226)*	
INDIANA	40.6%	23.0%	+17.6	54.3%	40.0%	+14.3
	(N=448)	*(N=178)*		*(N=381)*	*(N=145)*	
IOWA	54.6%	30.5%	+24.1	60.9%	37.0%	+23.9
	(N=205)	*(N=59)*		*(N=174)*	*(N=73)*	
KANSAS	37.4%	13.8%	+23.6	51.1%	20.3%	+30.8
	(N=230)	*(N=87)*		*(N=184)*	*(N=79)*	
KENTUCKY	33.6%	27.1%	+6.5	44.3%	26.2%	+18.1
	(N=467)	*(N=144)*		*(N=465)*	*(N=122)*	
LOUISIANA	39.3%	23.9%	+15.4	43.0%	27.2%	+15.8
	(N=331)	*(N=197)*		*(N=372)*	*(N=217)*	
MAINE	48.4%	27.3%	+21.1	52.3%	25.7%	+26.6
	(N=95)	*(N=33)*		*(N=86)*	*(N=35)*	
MARYLAND	61.6%	41.6%	+20.0	63.5%	49.0%	+14.5
	(N=250)	*(N=101)*		*(N=200)*	*(N=96)*	
MASSACHUSETTS	41.0%	22.5%	+18.5	42.0%	24.1%	+17.9
	(N=105)	*(N=80)*		*(N=119)*	*(N=87)*	
MICHIGAN	54.4%	25.8%	+28.6	71.0%	48.1%	+23.0
	(N=572)	*(N=248)*		*(N=449)*	*(N=154)*	
MINNESOTA	45.1%	18.6%	+26.4	53.2%	30.8%	+22.5
	(N=284)	*(N=102)*		*(N=248)*	*(N=78)*	
MISSISSIPPI	28.7%	19.4%	+9.3	36.2%	19.9%	+16.3
	(N=505)	*(N=191)*		*(N=472)*	*(N=191)*	
MISSOURI	38.1%	22.1%	+16.0	40.5%	20.4%	+20.1
	(N=530)	*(N=199)*		*(N=425)*	*(N=191)*	

Table 4. Seat Belt Use by Fatally Injured Occupants by State, FARS 1998 & 2007

State	1998 Day	1998 Night	1998 Day-Night Difference	2007 Day	2007 Night	2007 Day-Night Difference
MONTANA	39.2% *(N=120)*	24.3% *(N=37)*	+14.8	38.0% *(N=108)*	14.1% *(N=64)*	+23.9
NEBRASKA	31.4% *(N=137)*	13.7% *(N=51)*	+17.7	47.8% *(N=113)*	12.8% *(N=47)*	+35.0
NEVADA	46.6% *(N=163)*	25.0% *(N=60)*	+21.6	56.6% *(N=145)*	28.3% *(N=60)*	+28.2
NEW HAMPSHIRE	29.0% *(N=69)*	28.6% *(N=14)*	+0.4	28.3% *(N=60)*	21.1% *(N=19)*	+7.3
NEW JERSEY	42.0% *(N=326)*	29.4% *(N=119)*	+12.6	60.2% *(N=266)*	40.2% *(N=122)*	+20.0
NEW MEXICO	45.6% *(N=180)*	36.2% *(N=69)*	+9.3	49.4% *(N=166)*	30.2% *(N=53)*	+19.2
NEW YORK	56.9% *(N=534)*	30.9% *(N=188)*	+26.1	67.4% *(N=430)*	54.5% *(N=167)*	+13.0
NORTH CAROLINA	61.5% *(N=697)*	34.3% *(N=230)*	+27.2	59.9% *(N=716)*	40.6% *(N=286)*	+19.4
NORTH DAKOTA	28.6% *(N=35)*	14.3% *(N=21)*	+14.3	44.7% *(N=38)*	22.6% *(N=31)*	+22.2
OHIO	39.9% *(N=614)*	20.2% *(N=302)*	+19.7	49.4% *(N=547)*	23.1% *(N=247)*	+26.3
OKLAHOMA	34.4% *(N=398)*	19.6% *(N=158)*	+14.8	51.2% *(N=342)*	27.8% *(N=115)*	+23.3
OREGON	67.0% *(N=233)*	46.7% *(N=90)*	+20.3	66.1% *(N=168)*	66.7% *(N=60)*	-0.06
PENNSYLVANIA	39.6% *(N=561)*	21.0% *(N=281)*	+18.6	45.6% *(N=535)*	24.6% *(N=268)*	+21.0
RHODE ISLAND	25.0% *(N=36)*	0.0% *(N=14)*	+25.0	50.0% *(N=14)*	50.0% *(N=12)*	0.0
SOUTH CAROLINA	42.0% *(N=469)*	26.2% *(N=191)*	+15.8	41.7% *(N=396)*	23.0% *(N=235)*	+18.7
SOUTH DAKOTA	36.6% *(N=71)*	24.0% *(N=25)*	+12.6	34.5% *(N=58)*	0.0% *(N=20)*	+34.5
TENNESSEE	31.4% *(N=601)*	15.5% *(N=265)*	+16.0	44.1% *(N=558)*	29.3% *(N=229)*	+14.8
TEXAS	54.1% *(N=1,532)*	34.7% *(N=763)*	+19.4	66.0% *(N=1,267)*	48.1% *(N=651)*	+17.9
UTAH	37.7% *(N=159)*	10.8% *(N=37)*	+26.9	62.9% *(N=105)*	47.1% *(N=34)*	+15.8
VERMONT	36.4% *(N=44)*	5.3% *(N=19)*	+31.1	67.7% *(N=31)*	0.0% *(N=7)*	+67.7
VIRGINIA	43.5% *(N=430)*	25.2% *(N=155)*	+18.3	42.9% *(N=431)*	28.2% *(N=209)*	+14.7
WASHINGTON	49.3% *(N=288)*	26.3% *(N=137)*	+23.0	66.8% *(N=214)*	50.0% *(N=106)*	+16.8
WEST VIRGINIA	37.6% *(N=173)*	14.5% *(N=62)*	+23.1	48.7% *(N=154)*	29.4% *(N=68)*	+19.3
WISCONSIN	47.2% *(N=303)*	17.9% *(N=145)*	+29.3	51.6% *(N=287)*	20.0% *(N=150)*	+31.6
WYOMING	37.1% *(N=70)*	6.9% *(N=29)*	+30.2	46.3% *(N=67)*	16.0% *(N=25)*	+30.3

Note: Based on the number of fatally injured front-seat occupants who were wearing seat belts in passenger vehicles.

Relationships With Daytime Observational Survey Results

In Table 5, correlations between State daytime observational seat belt use rates and seat belt use among fatally injured occupants are presented for daytime, nighttime, and all hours. Observed rates were strongly related to all three measures of seat belt use rates in fatal crashes. That is, States with higher daytime observed seat belt use tended to have higher seat belt use rates in fatal crashes at all times (day, night, and overall). Correlations between daytime measures were stronger than for nighttime rates, but only since 2003. In the previous five years, 1998-2002, the correlation between daytime observed rates and rates among fatally injured occupants was stronger for nighttime than daytime crashes in three of the years. There has been a trend for the correlations between daytime observed rates and daytime rates among fatally injured occupants to increase. The highest reported correlation (0.80) was achieved in 2007. Over the same period, yearly correlations with nighttime rates among fatally injured drivers have decreased slightly. However, computed over 10 years' worth of data, the correlation with nighttime fatalities was 0.67, compared with 0.72 for daytime fatalities.

Table 5. Correlations Between Daytime Observed Seat Belt Use and FARS Seat Belt Use

Year	Daytime FARS		Nighttime FARS		All FARS	
	r	p<	r	p<	r	p<
1998	0.72	*0.0001*	0.68	*0.0001*	0.75	*0.0001*
1999	0.50	*0.0001*	0.66	*0.0001*	0.64	*0.0001*
2000	0.70	*0.0001*	0.69	*0.0001*	0.74	*0.0001*
2001	0.80	*0.0001*	0.74	*0.0001*	0.80	*0.0001*
2002	0.65	*0.0001*	0.68	*0.0001*	0.71	*0.0001*
2003	0.78	*0.0001*	0.68	*0.0001*	0.79	*0.0001*
2004	0.78	*0.0001*	0.70	*0.0001*	0.79	*0.0001*
2005	0.78	*0.0001*	0.58	*0.0001*	0.74	*0.0001*
2006	0.71	*0.0001*	0.68	*0.0001*	0.78	*0.0001*
2007	0.80	*0.0001*	0.63	*0.0001*	0.80	*0.0001*
overall	***0.72***	***0.0001***	***0.67***	***0.0001***	***0.75***	***0.0001***

Notes: Daytime observed seat belt use rates were based on statewide surveys. FARS seat belt use rates were based on the number of fatally injured front-seat occupants who were wearing seat belts in passenger vehicles.

Table 6 shows correlations between State daytime observational seat belt use rates and daytime, nighttime, and all fatalities per 10,000 population. States with higher daytime observed seat belt use tended to have lower fatalities among front-seat occupants of passenger vehicles. The relationships were statistically significant for day, night, and overall for each year, 1998-2007. The correlations based on daytime fatality rates (range: -0.32 to -0.51; overall, -0.38) were only slightly higher than those based on nighttime fatality rates (range: -0.33 to -0.48; overall, -0.36). However, there was a modest trend of increases in the relationships between daytime observed seat belt use and daytime fatalities. No such trend was evident for nighttime rates.

Table 6. Correlations Between Observed Seat Belt Use and Fatality Rate per 10,000 Population

Year	Daytime FARS		Nighttime FARS		All FARS	
	r	p	r	p	r	p
1998	-0.34	*0.015*	-0.35	*0.014*	-0.35	*0.012*
1999	-0.38	*0.008*	-0.43	*0.003*	-0.41	*0.005*
2000	-0.32	*0.025*	-0.44	*0.002*	-0.37	*0.009*
2001	-0.34	*0.018*	-0.34	*0.017*	-0.35	*0.014*
2002	-0.41	*0.003*	-0.39	*0.006*	-0.42	*0.003*
2003	-0.37	*0.008*	-0.34	*0.016*	-0.38	*0.007*
2004	-0.51	*<.0001*	-0.48	*<.0001*	-0.52	*<.0001*
2005	-0.46	*0.001*	-0.42	*0.002*	-0.46	*0.001*
2006	-0.43	*0.002*	-0.33	*0.018*	-0.42	*0.002*
2007	-0.42	*0.002*	-0.37	*0.008*	-0.42	*0.002*
overall	***-0.38***	***<.0001***	***-0.36***	***<.0001***	***-0.39***	***<.0001***

Notes: Daytime observed seat belt use rates were based on statewide surveys. FARS rates were based on the number of fatally injured front-seat occupants in passenger vehicles per 10,000 population.

Targets for Improvements in Nighttime Seat Belt Use

To explore the factors relevant to daytime and nighttime seat belt use in fatal crashes, a number of binary logistic regressions were computed. The first regression was conducted on all front-seat occupants, a second one was conducted on drivers only using factors unique to drivers, and third one was conducted looking at the impact of alcohol on seat belt use. Significance level was set at $p \leq .001$ in all cases.

Table 7 includes information on daytime and nighttime seat belt use rates among fatally injured front-seat occupants of passenger vehicles, along with day/night differences by various categories describing gender, age, location of the crash, roadway type, and type of vehicle involved. These data are based on three years of FARS data (2005 to 2007) including all fatally injured outboard front-seat occupants of passenger vehicles (16 and older, with seat belt use known). Table 8 presents data for drivers: their prior record in relation to seat belt use in the present crash, and whether or not they were assigned a driver-related factor indicating that they are likely to have caused the crash (i.e. likely accountable). Table 9 presents five years of data on driver BACs, based on a smaller data set of States with good chemical testing and reporting rates. The intent was to examine the data in these three tables to determine anomalies between day and nighttime fatality rates and seat belt use rates. In particular, the interest was in the extent to which some subgroups showed particularly sharp drops in seat belt use at night, compared with daytime use, and to identify categories associated with particularly low nighttime rates.

Analysis of All Front-Seat Occupants

A backward stepwise logistic regression was carried out to test the significance level of these differences and to explore the factors related to seat belt use in daytime and nighttime fatal crashes. The analyses were based on three years of FARS data (2005 to 2007) including all fatally injured outboard front-seat occupants of passenger vehicles

(16 and older, with seat belt use known). In addition to the Daytime factor (day, night), seven additional variables were used in the model: Sex (male, female), Age (under 45, 45 and older), Law (primary, secondary), Rural (rural, urban), Road Type (interstate/arterial, collector/local), Vehicle Type (SUV/van, pickup, car), and Day (weekend, weekday). Main effects of all eight predictors were tested, as well as two-way and three-way interactions involving the Daytime variable. Significance level was set at $p \leq .001$ (Appendix B provides relevant statistics for the final regression model).

In all, 7 main effects survived the regression at the set significance level, as did 3 of the 7 two-way interactions, and 8 of the 21 three-way interactions. Overall seat belt use was significantly lower at night, among males, younger occupants, occupants of pickup trucks, in secondary law jurisdictions, in rural areas, and on collector/local roads. These differences also exist in seat belt use observational surveys, although concordance in the age categories cannot be fully determined since age is difficult to estimate by observation.

Table 7 shows that FARS seat belt use was much lower at night than during the day for every category, by an average of 17.0 percentage points (range: 11.0 to 20.0 in the 15 categories in Table 7). The disparities between day and night belt use were not uniform, however. There were significant two-way interactions between Daytime and (1) Age, (2) Road Type, and (3) Vehicle Type. There were greater daytime/nighttime disparities in FARS belt use among those 45 and older compared with those younger than 45, on interstate/arterial roads compared with collector/local roads, and among occupants of cars compared with occupants of SUVs/vans.

Table 7. Daytime and Nighttime Seat Belt Use for Selected Factors, FARS 2005-2007

Factor	Day (4 a.m. - 8:59 p.m)	Night (9 p.m. - 3:59 a.m.)	Day-Night Difference
Sex			
Male	47.0% *(N=31,902)*	31.3% *(N=16,645)*	+15.7
Female	61.6% *(N=18,860)*	44.1% *(N=5,395)*	+17.5
Age			
16 to 44	43.5% *(N=25,589)*	32.5% *(N=17,477)*	+11.0
45 and older	61.4% *(N=25,175)*	42.1% *(N=4,565)*	+19.3
Vehicle Type			
SUV/Van	48.1% *(N=10,561)*	30.4% *(N=4,402)*	+17.7
Pickup	37.8% *(N=10,257)*	22.0% *(N=4,784)*	+15.8
Car	58.9% *(N=12,279)*	40.5% *(N=7,634)*	+18.4
Law			
Primary	56.8% *(N=31,344)*	39.9% *(N=13,571)*	+16.9
Secondary	45.2% *(N=19,420)*	25.7% *(N=8,471)*	+19.5
Rural/Urban			
Rural	50.6% *(N=32,981)*	30.6% *(N=12,515)*	+20.0
Urban	55.8% *(N=17,276)*	39.7% *(N=9,333)*	+16.1
Road Type			
Interstate/Arterial	58.3% *(N=30,721)*	40.5% *(N=12,111)*	+17.8
Collector/Local	43.3% *(N=19,285)*	27.1% *(N=9,563)*	+16.2
Day			
Weekend	48.9% *(N=14,936)*	33.3% *(N=12,083)*	+15.6
Weekday	53.8% *(N=35,828)*	35.9% *(N=9,959)*	+17.9

Note: FARS seat belt use rates were based on three years of data for fatally injured outboard front-seat occupants (age 16 and up, with seat belt use known).

Four of the three-way interactions involving Daytime and Age survived the model at the set significance level. The Daytime x Age x Sex interaction indicated that the day/night difference among the older group (45+) was larger in male than in female occupants. The reverse was true of those 44 and younger. The added influence of law type on the Daytime x Age interaction showed that the greater day/night difference in the older age group was larger in secondary jurisdictions than in primary law areas. The interaction between daytime, age, and rural showed that the day/night difference in those 45 and older was greater in rural compared to urban areas. Finally, the Daytime x Age x Weekend interaction showed that the larger day/night difference in the older group was larger on weekends than on weekdays.

Two of the three-way interactions involving Daytime and Vehicle Type survived the analysis. The Daytime x Vehicle Type x Rural showed that the larger day/night difference found in cars was even larger in rural areas compared to urban areas. The added impact of Road Type showed that the larger day/night difference in cars was greater on interstate/arterial roads than on collector/local roads. There was also a significant Daytime x Road x Rural interaction. It showed a larger day/night difference on interstate/arterial roads in rural areas than in urban areas. Lastly, the Daytime x Rural x Law interaction showed a larger day/night difference in rural areas in secondary States than in primary States.

FARS seat belt use among pickup truck occupants at night is notable in that this is a group with low seat belt use during the day, and their nighttime use (22%) was the lowest of any category. Other groups with low FARS nighttime use were males (31%), occupants under 45 (33%), SUV/van drivers and passengers (30%), secondary law States (26%), rural locations (31%), and collector and local roads (27%). These categories also showed the lowest daytime seat belt use, and as such, most often did not show the largest discrepancy from day to night.

Analysis of Drivers Only

To expand on the analyses performed on all occupants, supplemental analyses were computed on variables unique to drivers as well as some basic factors. These variables included daytime, sex, and age, as well as information pertaining to the operator's driving record, and designation of driver likely accountable or not in the fatal crash. Driver record information was related to factors recorded in the three years prior to the crash. Fatally injured drivers 16 and older, with known seat belt use, traveling in a passenger vehicle were included in the analysis. As was the case with all occupants, a backward stepwise logistic regression was done on three years of FARS data (2005 to 2007) and significance level was set at $p \leq .001$. Nine variables were entered in the regression: Daytime (day, night), Sex (male, female), Age (under 45, 45 and older), Accountable (likely accountable, not accountable), Crash (at least one crash recorded in previous 3 years, no crash), Suspension (suspended license recorded in previous 3 years, no suspension), DWI (at least one DWI conviction recorded in previous 3 years, no DWI conviction), Speeding (at least one speed conviction recorded in previous 3 years, no speed conviction), and Violation (other harmful moving violation recorded in previous 3 years, no other violation).

Main effects for these 9 variables were entered into the regression model, along with two-way and three-way interactions involving Daytime. Table 8 displays seat belt use data for drivers with various records and for drivers designated as likely accountable or not. In all, 5 of the 9 main effects survived the regression at the set significance level, along with 3 of the 8 two-way interactions, and 3 of the 28 three-way interactions

(Appendix C provides relevant statistics for the final regression model). Overall seat belt use percentages were lower in drivers who were male, in the younger group, likely accountable, with previous suspension(s), and with other moving violation(s).

Table 8. Daytime and Nighttime Seat Belt Use by Drivers, FARS 2005-2007

Subgroup	Day (4 a.m. - 8:59 p.m.)	Night (9 p.m. - 3:59 a.m.)	Day-Night Difference
Previous Crash*			
None	52.7% *(N=32,587)*	33.8% *(N=13,746)*	+18.9
One or more	46.1% *(N=4,973)*	32.0% *(N=2,377)*	+14.1
Previous Suspension*			
None	54.2% *(N=35,471)*	36.2% *(N=13,375)*	+18.0
One or more	33.1% *(N=3,201)*	23.7% *(N=2,882)*	+9.4
Previous DWI*			
None	52.4% *(N=39,094)*	34.2% *(N=16,020)*	+18.2
One or more	28.4% *(N=1,165)*	22.3% *(N=1,130)*	+6.1
Previous Speeding*			
None	53.7% *(N=33,414)*	34.6% *(N=13,005)*	+19.1
One or more	41.6% *(N=6,845)*	29.8% *(N=4,146)*	+11.8
Previous Other Harmful Moving Violation*			
None	53.8% *(N=34,385)*	35.4% *(N=13,541)*	+18.4
One or more	39.4% *(N=5,874)*	26.3% *(N=3,609)*	+13.1
Likely Accountable Driver			
Not	69.8% *(N=7,101)*	64.4% *(N=1,874)*	+5.4
Likely Accountable	47.8% *(N=33,913)*	29.7% *(N=15,703)*	+18.1

*recorded in the previous three years

Note: FARS seat belt use rates were based on three years of data for fatally injured drivers (16 and older, with seat belt use known).

Three of the surviving two-way interactions reached significance: Daytime x Sex, Daytime x Likely Accountable, and Daytime x Suspension. Female drivers had higher FARS seat belt use and showed a greater day/night difference than did male drivers. Drivers who were likely to have caused the crash had lower FARS seat belt use than drivers who were not likely accountable, and the likely accountable drivers showed a much larger day/night difference compared to not-likely-accountable drivers. Finally, drivers with no suspension on their record had higher seat belt use than drivers with a previous suspension, but drivers with no suspension showed a greater day/night difference than those with previous suspension(s).

A significant three-way interaction emerged among Daytime, Sex, and Speeding, which revealed that the greater day/night difference found in female drivers was greater for those with no previous speeding convictions than those with previous speeding convictions. The Daytime x Likely Accountable x Age interaction showed that the greater day/night difference found in drivers who were likely accountable for the crash is magnified in those ages 45 and above compared to the younger group of drivers. Lastly, there was a Daytime x Speed x DWI interaction. This interaction showed that the day/night difference in drivers without previous speeding convictions was greater in drivers without previous DWI convictions.

Generally, drivers with clean records had higher seat belt use on average both daytime and nighttime, and although they showed a greater disparity in FARS seat belt use from daytime to nighttime (from an average of 53% during the day to 29% at night), drivers with crashes or violations on their records had particularly low FARS nighttime seat belt use (27% on average at night, compared to 38% seat belt use in daytime).

Analysis of Alcohol Involvement

The role of alcohol in daytime and nighttime seat belt use was also explored. 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. Only States that reported chemical test results in at least 80% of cases (averaged over 10 years, 1998-2007) were included in the analyses. Twenty-eight States met the criteria. Five years of FARS data were included in the analysis (2003 to 2007, drivers only).

An alcohol-involvement variable was created, identifying drivers with BACs of .08 or above. A backward logistic regression was performed with 15 variables entered, along with two- and three-way interactions involving Daytime and Alcohol. In addition to Daytime and Alcohol (zero, .08+), the variables Sex, Primary, Rural, Road Type, Vehicle, Age, Weekend, Accident, Suspension, DWI, Speed, Moving Violation, and Likely Accountable were included in the model. Ten of the 15 main effects survived the regression at the set significance level ($p \leq .001$): Daytime, Sex, Primary, Road Type, Vehicle, Age, Suspension, Moving Violation, Likely Accountable, and Alcohol. FARS seat belt use was substantially greater in the No Alcohol group than in the .08+ group (see Table 9). The Daytime x Alcohol interaction did not survive in the final model, and none of the surviving three-way interactions reached the set significance level (Appendix D). Although it is clear that alcohol is a relevant factor in seat belt use, there is no evidence of a differential impact of alcohol in day versus night belt use in fatal crashes; seat belt use was relatively low among fatally injured alcohol-impaired drivers *both* day and night.

Table 9 presents alcohol data in two ways: zero BAC compared with any positive BAC, and zero BAC compared with BACs of .08 g/dL and higher. The results have similarities but are slightly different. In both comparisons, seat belt use was much higher among zero BAC drivers, both night and day. Nighttime use is lower among zero BAC drivers, and also for drivers who were alcohol-positive (BAC > .01 g/dL), although the night/day differences for alcohol-positive drivers were small. Alcohol-positive drivers, especially high-BAC drivers, tended to have low seat belt use both day and night.

Table 9. Daytime and Nighttime Seat Belt Use Among Fatally Injured Drivers by Driver BAC, FARS 2003-2007

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

Alcohol involvement in fatal crashes is mostly a nighttime phenomenon. Among daytime crashes, 25% of the drivers had positive BACs, whereas during nighttime hours, 70% of fatally injured drivers had positive BACs, and more than 90% of these positive-BAC drivers had illegal BACs of .08 g/dL or greater.

Effect of Primary Laws on Nighttime Seat Belt Use

In Table 10, data are presented on nighttime and daytime seat belt use rates among fatally injured occupants for secondary and primary enforcement States, for each of the years 1998 through 2007 and combined over the 10 years. The composition of secondary and primary States shifted some over the 10-year period, as States changed from secondary to primary during this interval. However, as discussed below, there were also differing trends over time in secondary and primary States.

It is well known that primary seat belt use status confers a significant advantage in terms of daytime observed use, and that was confirmed in the analyses based on fatally injured occupants. That advantage also extends to nighttime use. Table 10 indicates that overall, FARS daytime seat belt use was 14.2 percentage points higher in primary States than in secondary States (56.4% in primary versus 42.2% in secondary), and FARS nighttime seat belt use was 14.9 points higher in primary States (38.5% in primary versus 23.6% in secondary). For both secondary and primary States, nighttime use was substantially lower than daytime use, by an average of 17.9 percentage points for primary States in the 10-year period, and 18.6 percentage points on average for secondary States.

These relationships changed over the 10-year period. In particular, day/night differences narrowed some in the primary States. The day-to-night difference in 2007 FARS belt use was 16.3 percentage points in primary States (56.7% day versus 40.5% night). The day/night difference was greater in secondary States (compared to primary

States) with a difference of 21.9 percentage points between day and night FARS belt use in the secondary States (47.4% day versus 25.6% night).

Table 10. FARS Daytime and Nighttime Seat Belt Use by Law Type, 1998-2007

	Primary			Secondary		
Year	**Day**	**Night**	**Day-Night Difference**	**Day**	**Night**	**Day-Night Difference**
1998	54.6% *(N=6,885)*	33.6% *(N=2,819)*	+21.0	40.2% *(N=10,937)*	21.6% *(N=4,276)*	+18.7
1999	52.1% *(N=7,464)*	31.7% *(N=2,946)*	+20.4	40.4% *(N=10,537)*	22.8% *(N=4,171)*	+17.6
2000	54.5% *(N=8,255)*	37.8% *(N=3,442)*	+16.6	40.3% *(N=9,554)*	22.8% *(N=3,934)*	+17.5
2001	56.3% *(N=8,476)*	36.9% *(N=3,407)*	+19.4	40.7% *(N=9,392)*	22.9% *(N=3,980)*	+17.8
2002	56.9% *(N=8,509)*	39.1% *(N=3,738)*	+17.8	41.4% *(N=9,625)*	22.4% *(N=4,063)*	+19.0
2003	58.8% *(N=9,262)*	39.5% *(N=3,813)*	+19.3	43.4% *(N=8,867)*	24.6% *(N=3,562)*	+18.8
2004	58.8% *(N=9,811)*	42.2% *(N=4,060)*	+16.6	43.8% *(N=8,234)*	24.0% *(N=3,278)*	+19.8
2005	57.8% *(N=10,074)*	40.7% *(N=4,315)*	+17.1	43.4% *(N=7,716)*	25.4% *(N=3,123)*	+18.0
2006	56.0% *(N=10,947)*	38.7% *(N=4,728)*	+17.4	45.6% *(N=6,142)*	26.2% *(N=2,734)*	+19.4
2007	56.7% *(N=10,323)*	40.5% *(N=4,528)*	+16.3	47.4% *(N=5,562)*	25.6% *(N=2,614)*	+21.9
overall	*56.4% (N=90,006)*	*38.5% (N=37,796)*	*+17.9*	*42.2% (N=86,566)*	*23.6% (N=35,735)*	*+18.6*

Note: FARS seat belt use rates were based on data for fatally injured front-seat occupants of passenger vehicles (age 16 and up, with seat belt use known).

A binary logistic regression was computed to explore the impact of a seat belt law change on day and night belt use among fatally injured front-seat occupants of passenger vehicles. Significance level was set at $p \leq .001$. The impact of changing the seat belt law from secondary to primary on daytime and nighttime seat belt use was explored using FARS data from six conversion States (Michigan, New Jersey, Washington, Delaware, Illinois, and Tennessee). Data from the three years prior to the law change were compared to data from the three years after the law change (year of law change itself was excluded). Data are presented in Table 11. A backward logistic regression was computed using eight variables as predictors of FARS seat belt use: Daytime (day, night), Sex (male, female), Rural (urban, rural), Road Type (interstate/arterial, collector/local), Vehicle Type (SUV, pickup, car), Age (under 45, 45 and older), Weekend (weekday, weekend), and Pre/Post (pre-law change, post-law change). The main effects of these variables along with two- and three-way interactions involving Daytime and Law were entered in the model. Seven of the main effects survived the regression at the $p \leq .001$ level (all but Weekend).

Table 11. FARS Daytime and Nighttime Seat Belt Use by Pre and Post Law Change

Law	Day (4 a.m. - 8:59 p.m.)	Night (9 p.m.- 3:59 a.m.)	Day-Night Difference
Pre	45.5%	26.3%	+19.2
Post	55.7%	37.2%	+18.5

Note: FARS seat belt use rates were based on data for fatally injured front-seat occupants of passenger vehicles (16 and older, with seat belt use known) in six States that converted their seat belt laws from secondary to primary (i.e., Michigan, New Jersey, Washington, Delaware, Illinois, and Tennessee).

The results indicated that FARS seat belt use was higher after the conversion to a primary law than it was prior to the law. Table 11 shows that this was the case for both daytime and nighttime seat belt use. However, neither the Daytime x Pre/Post interaction nor any of the three-way interactions survived the regression (see Appendix E). There is therefore no evidence that a change in law had a differential impact on day and night seat belt use in fatal crashes.

Previous studies looking at changes in seat belt law showed a greater effect of law change at night than during the day (Masten, 2007; Chaudhary et al., in press). When data were broken down by State (Table 12), the current data paralleled what was found previously. Looking at pre-to-post changes on a State level, four of the six conversion States show a greater pre-post difference at nighttime than during the daytime.

Table 12. Pre- and Post-Law Changes in FARS Seat Belt Use by State, Day versus Night

State	Law	Pre-Law Change	Post-Law Change	Pre-Post Difference
Delaware	Day	39.0%	55.9%	+16.9
	Night	21.4%	50.0%	+28.6
Illinois	Day	46.5%	56.5%	+10.0
	Night	26.0%	34.7%	+8.7
Michigan	Day	53.2%	65.4%	+12.2
	Night	28.3%	41.5%	+13.2
New Jersey	Day	42.1%	50.2%	+8.1
	Night	26.4%	37.4%	+11.0
Tennessee	Day	37.4%	44.8%	+7.4
	Night	22.9%	27.4%	+4.5
Washington	Day	49.4%	64.8%	+15.4
	Night	30.0%	50.6%	+20.6

Note: FARS seat belt use rates were based on data for fatally injured front-seat occupants of passenger vehicles (16 and older, with seat belt use known) in six States that converted their seat belt laws from secondary to primary.

IV. Discussion

Fatalities occurring during the seven-hour period from 9 p.m. to 3:59 a.m. constitute almost one-third of all motor vehicle deaths, despite the low traffic volume during these hours. One of the factors contributing to the high nighttime death rate is lack of seat belt use. It has been known previously that seat belt use is lower at night than during the day, but information that would assist in finding ways to improve nighttime seat belt use has been limited. This study investigated the day/night difference in seat belt use among fatally injured drivers and passengers, by personal, environmental, and vehicle characteristics. Such information is an essential precursor to identifying intervention points and strategies addressing nighttime fatalities and seat belt use.

Study results confirmed that night seat belt use is lower than daytime use, but by a much wider margin than has been found in observational studies. This makes nighttime seat belt use even more cause for concern. The difference in day and night FARS seat belt use averaged about 18 percentage points from 1998 to 2007. Over this period there were increases in both daytime and nighttime seat belt use found in the FARS data; in 1998, daytime and nighttime belt use were 45.8% and 26.3%, respectively, and in 2007 daytime and nighttime use were 53.5% and 35.0%, respectively. These increases parallel those found in daytime observational surveys of seat belt usage.

Daytime observed seat belt use rates were moderately predictive of nighttime seat belt use rates in the fatally injured population and somewhat less predictive of nighttime fatality rates. Although States can know their seat belt use rate in the fatally injured population, in many States the numbers for any one year are too small to be interpretable or to be useful in tracking trends. Therefore, a statewide observational survey of nighttime belt use would likely aid States in their efforts to track trends and improve nighttime seat belt use. Guidelines for appropriate sampling and estimation procedures for measuring nighttime seat belt use are available to States (Chaudhary et al., 2010).

Nighttime and daytime seat belt use in the fatally injured population were compared by age, gender, vehicle type, primary/secondary seat belt law, rural/urban, road type, weekday/weekend, driver record, likely accountable status, and alcohol use. Groups with lower FARS seat belt use both day and night were males, younger occupants, pickup truck occupants, residents of secondary States, occupants traveling in rural areas, occupants killed on local roads, occupants killed on weekends, drivers with crashes and violations on their records, drivers likely accountable in the crash, and drivers with high BACs.

The regression analyses allowed a thorough investigation of the day/night disparities in FARS seat belt use for the various categories. Many of the interactions appeared to have little practical significance; however, the analysis did reveal some anomalies that may account for some of the differences in day and night seat belt use. For example, greater nighttime/daytime differences tended to occur in the traditionally higher belt use groups: occupants ages 45 and older, occupants on interstate roads, car occupants, and drivers with clean records. These groups showed the greatest difference in belt use from day to night. It is unclear why belt use was lower at night than during the day for these groups, but this finding suggests that efforts to increase night seat belt use that focus on a broad audience that includes traditionally low-use groups such as pickup truck occupants and relatively high-use groups such as those 45 and older might be productive.

The analysis revealed that there are several groups with particularly low FARS nighttime seat belt use that can be targeted for special attention. These groups include alcohol-impaired drivers (nighttime belt use 26%), pickup truck occupants (22%), rural locations (31%), and residents of secondary enforcement States (26%).

Alcohol-impaired drivers are a particularly important target. This group illustrates a main reason why crash rates are higher during nighttime hours and seat belt use lower. In the 28-State sample that had good reporting of chemical test data, drivers with illegal BACs were more likely to be fatally injured at night, comprising more than two-thirds (68%) of fatally injured drivers killed between 9 p.m. and 3:59 a.m. At other hours, alcohol-impaired drivers comprised 22% of all those killed in crashes. Interestingly, this is one group whose seat belt use during the daytime (28%) was not markedly higher that at night (26%). Thus a large part of the disparity in day/night seat belt use is due to the greater numbers of unbelted alcohol-impaired drivers at night.

Programs have attempted to address both problems by targeting both alcohol-impaired driving and seat belt use with integrated programs. Past programs of this type have had some success. In the late 1980s a program in Binghamton, New York, called *Buckle Up and Drive Sober* combined seat belt enforcement with alcohol enforcement. The concept was that seat belt law violations would be enforced, particularly at night, and each driver stopped would be screened using a passive alcohol sensor (Wells, Preusser, & Williams, 1992). The two-year effort included a series of combined seat belt use and alcohol night checkpoints, supported by paid media. During the course of the program, more than 5,000 drivers were tested for BAC at checkpoints and more than 10,000 drivers were observed for seat belt use during nighttime hours. Results indicated that the number of alcohol-positive drivers observed at checkpoints decreased from 23% before the program to 14% after, and seat belt use at night rose from 35% to 49%.

However, a combined campaign that was pilot-tested in Tennessee failed to show the effectiveness of combined messages for increasing seat belt use (Lacey, Fell, Cosgrove, Falb, & Brainard, 2004). The study tested a seat belt message (*Click It or Ticket*) and an impaired driving message (*You Drink and Drive, You Lose*) separately and in combination, along with high-visibility enforcement. An evaluation of this campaign found that the region with the combined messages failed to improve observed seat belt use, whereas the regions with separate seat belt messages found increases in observed belt use. The combined approach fared better at reducing the number of alcohol-positive drivers on the road (measured by anonymous breath samples). The seat belt message may have been overwhelmed by the impaired driving message as the illegal BAC limit was lowered in Tennessee during the study, resulting in additional media emphasis on impaired driving.

In another study conducted in two Canadian cities in the 1980s, nighttime seat belt use among patrons leaving drinking establishments was targeted (Malenfant & Van Houten, 1988). Checkpoints were located near the establishments and media efforts included posters placed at tavern exits. Enforcement occurred over a four-week period on Thursday and Friday nights, between 9 p.m. and 2 a.m. Seat belt use by drivers leaving bars increased over this period, from 54% to 63% in one city, and 58% to 74% in the other, and use remained elevated after one month (62% in the first city, 66% in the second).

Modern nighttime seat belt enforcement programs have typically not targeted alcohol-impaired drivers. However, in a study in Asheville, North Carolina, that used nighttime checkpoints for seat belt enforcement, drivers were also asked to provide voluntary breath tests. It was found that the number of drivers who had been drinking decreased from 16% to 10% over the course of the program (Solomon, Chaffe, & Preusser, under review).

Pickup truck occupants had the lowest nighttime FARS seat belt use of any of the groups studied and also had low daytime use. Both pickup truck occupants and rural residents have been targeted as consistently low-belt-use populations, and special high visibility enforcement programs have been designed to increase their seat belt use. The programs have had some success. The *Buckle Up in Your Truck* program undertaken in the NHTSA's South Central Region in 2005 and 2006 was associated with an increase in seat belt use from 60% in 2004 to 76% in 2006. The Central Region implemented the program in 2006, and seat belt use in pickups climbed from 57% to 65% (Tison et al., 2008). In the Great Lakes Region, a two-year program conducted in rural areas found a 9-percentage-point increase in observed use (Nichols et al., 2009). These were daytime programs, with results measured in terms of daytime use. However, the programs could be expanded to include nighttime enforcement as well.

States with primary enforcement of seat belt laws had higher FARS belt use both day and night than did States with secondary laws. Both primary and secondary States had lower belt use at night than during the day. Over the study period, there was an increasing trend for differences between primary and secondary States in belt use, particularly for nighttime seat belt use; in 2007, the latest year available, nighttime use was 14.9 percentage points higher in primary (40.5%) than in secondary law States (25.6%). This makes nighttime seat belt use of particular concern in secondary law States.

It is not clear the extent to which vehicle occupants who buckle up during the day are less likely to do so at night because seat belt use is more difficult for police to detect when it is dark. It is also unclear why this would be more likely in secondary States. It is clear, however, that nighttime enforcement programs have potential for increasing use in secondary States. The evidence thus far for the effects of nighttime enforcement in secondary States is positive. In a program in Reading, Pennsylvania, seat belt use increased from 50% to 56% (Chaudhary, Alonge, & Preusser, 2005); a program in Charleston, West Virginia, generally showed pre-to-post intervention increases in seat belt use (Solomon, Chaffe, & Preusser, 2009). However, the amount of enforcement in secondary States is known to be a key factor in higher use rates. A recent study of the cumulative effects of high visibility enforcement programs in the United States found that secondary States with the greatest increases in seat belt use had much greater levels of enforcement than secondary States with the least change (Tison & Williams, 2010). Given that finding, nighttime enforcement efforts in secondary States would seem to have great potential.

The analysis of pre-to-post changes in FARS belt use suggested that converting to primary enforcement status might increase seat belt use in secondary States both daytime and nighttime. It has long been established that this move results in higher daytime use. There is evidence from the present study and from prior work that this change increases both daytime and nighttime use, with nighttime use advancing at least as much as in the daytime if not more. Four out of the six States making this change during the study period had greater increases in nighttime than in daytime seat belt use.

In summary, the present study indicates that, based on seat belt use among fatally injured occupants, nighttime seat belt use is a problem, averaging 18 percentage points lower than during the daytime in the past 10 years. In large part, this is a problem involving alcohol-impaired drivers. Nighttime seat belt enforcement programs have shown potential, although they have been few in number and there is still a need to determine the most effective ways to combine enforcement and publicity during nighttime hours.

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Appendix A. Day and Night Belt Use by Fatally Injured Front-seat Occupants of Passenger Vehicles by State, FARS 1998- 2007

State		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ALABAMA	Day	33.0%	37.7%	41.4%	52.6%	46.3%	48.5%	50.0%	46.4%	44.8%	45.6%
	Night	21.0%	18.2%	22.7%	29.1%	28.6%	30.5%	31.1%	28.6%	29.8%	27.2%
ALASKA	Day	58.6%	41.4%	43.6%	54.3%	66.7%	58.1%	56.3%	56.7%	71.4%	58.1%
	Night	13.3%	26.7%	36.0%	31.3%	30.8%	20.0%	11.1%	58.3%	57.1%	50.0%
ARIZONA	Day	37.3%	42.5%	44.5%	43.3%	47.5%	48.4%	49.4%	47.0%	45.8%	44.7%
	Night	19.1%	21.4%	25.4%	27.1%	22.6%	34.6%	35.2%	29.5%	30.4%	31.1%
ARKANSAS	Day	33.2%	30.9%	38.3%	34.8%	36.5%	38.1%	35.2%	36.5%	37.9%	42.2%
	Night	17.1%	20.0%	20.7%	5.9%	13.1%	16.7%	20.6%	22.2%	12.4%	20.4%
CALIFORNIA	Day	65.6%	64.0%	66.3%	66.1%	64.1%	67.6%	67.7%	71.1%	71.8%	71.4%
	Night	47.5%	47.3%	55.9%	52.1%	52.0%	51.9%	56.1%	57.6%	60.2%	57.9%
COLORADO	Day	44.4%	45.9%	41.7%	45.8%	43.4%	51.0%	51.4%	51.6%	45.4%	52.8%
	Night	25.3%	28.3%	28.4%	28.3%	19.0%	25.0%	28.6%	28.4%	29.4%	26.2%
CONNECTICUT	Day	38.5%	43.7%	47.0%	53.9%	41.6%	55.6%	55.2%	52.9%	63.7%	53.3%
	Night	17.0%	30.8%	32.9%	26.5%	46.3%	35.0%	33.3%	39.7%	48.4%	54.0%
DELAWARE	Day	45.9%	34.1%	34.9%	43.9%	37.0%	57.4%	59.7%	54.4%	53.3%	62.2%
	Night	13.3%	13.0%	12.5%	32.3%	19.0%	25.8%	63.0%	29.2%	55.6%	56.7%
DISTRICT OF COL.	Day	44.4%	20.0%	50.0%	50.0%	71.4%	60.0%	75.0%	50.0%	100.0%	50.0%
	Night	27.3%	33.3%	40.0%	38.5%	60.0%	46.7%	50.0%	35.7%	28.6%	60.0%
FLORIDA	Day	45.7%	45.3%	40.3%	43.6%	44.8%	49.2%	48.9%	47.4%	47.9%	49.6%
	Night	22.3%	22.1%	22.1%	28.2%	26.5%	27.0%	24.3%	29.9%	30.1%	31.3%
GEORGIA	Day	52.9%	46.9%	46.4%	51.8%	50.5%	50.5%	47.8%	49.4%	49.6%	48.4%
	Night	22.4%	24.0%	32.5%	33.0%	32.2%	36.2%	37.9%	29.7%	32.1%	29.7%
HAWAII	Day	81.3%	61.9%	57.5%	52.5%	57.1%	66.7%	67.6%	71.0%	61.8%	68.0%
	Night	48.0%	25.0%	20.8%	26.3%	33.3%	59.3%	30.0%	17.6%	43.5%	53.6%
IDAHO	Day	33.3%	31.8%	40.6%	38.2%	43.8%	50.4%	53.8%	43.2%	53.7%	53.8%
	Night	21.4%	17.8%	11.1%	19.4%	22.5%	23.5%	37.3%	40.4%	32.1%	16.2%
ILLINOIS	Day	44.4%	44.2%	46.6%	47.2%	45.9%	50.5%	56.3%	56.8%	56.4%	56.2%
	Night	25.7%	29.4%	28.3%	28.5%	21.7%	28.4%	37.1%	38.9%	28.9%	35.4%
INDIANA	Day	40.6%	50.3%	46.1%	45.6%	52.2%	54.5%	52.4%	52.5%	51.1%	54.3%
	Night	23.0%	22.6%	30.9%	26.0%	30.8%	39.8%	35.9%	38.6%	38.9%	40.0%
IOWA	Day	54.6%	49.8%	55.7%	57.0%	54.0%	56.4%	56.9%	63.6%	64.0%	60.9%
	Night	30.5%	35.6%	35.8%	30.1%	26.1%	36.1%	33.9%	32.8%	38.6%	37.0%
KANSAS	Day	37.4%	36.2%	36.3%	32.3%	37.0%	35.7%	44.3%	36.3%	45.7%	51.1%
	Night	13.8%	26.4%	17.0%	18.4%	17.6%	25.6%	25.3%	21.9%	35.0%	20.3%
KENTUCKY	Day	33.6%	34.7%	37.1%	33.9%	38.7%	35.8%	36.8%	38.8%	36.5%	44.3%
	Night	27.1%	23.2%	25.0%	15.8%	27.2%	22.9%	24.5%	19.2%	21.2%	26.2%
LOUISIANA	Day	39.3%	39.0%	36.9%	45.1%	42.5%	45.2%	44.3%	47.0%	47.8%	43.0%
	Night	23.9%	18.3%	20.8%	22.2%	23.1%	18.2%	32.1%	27.1%	23.4%	27.2%
MAINE	Day	48.4%	52.3%	45.5%	44.8%	54.4%	44.3%	47.6%	46.6%	40.3%	52.3%
	Night	27.3%	30.8%	29.2%	33.3%	28.6%	34.1%	17.2%	30.8%	38.7%	25.7%
MARYLAND	Day	61.6%	60.9%	61.3%	63.7%	65.9%	60.2%	62.9%	60.3%	66.5%	63.5%
	Night	41.6%	33.0%	50.4%	41.7%	49.6%	38.5%	46.4%	48.3%	49.6%	49.0%
MASSACHUSETTS	Day	41.0%	33.6%	37.9%	31.9%	37.5%	41.6%	38.2%	37.5%	39.6%	42.0%
	Night	22.5%	17.3%	18.8%	14.9%	18.6%	23.2%	25.7%	26.9%	24.0%	24.1%
MICHIGAN	Day	54.4%	53.4%	63.2%	62.9%	66.5%	66.9%	68.1%	69.5%	72.9%	71.0%
	Night	25.8%	30.8%	40.6%	37.9%	48.8%	37.9%	42.6%	50.3%	46.5%	48.1%
MINNESOTA	Day	45.1%	44.1%	42.5%	38.0%	47.6%	52.6%	53.4%	50.9%	55.4%	53.2%
	Night	18.6%	24.4%	17.9%	29.1%	26.1%	27.2%	25.5%	35.0%	23.6%	30.8%
MISSISSIPPI	Day	28.7%	29.1%	28.9%	32.2%	31.2%	37.2%	25.0%	29.5%	31.0%	36.2%
	Night	19.4%	11.1%	18.4%	23.3%	18.0%	26.1%	13.3%	21.1%	21.4%	19.9%
MISSOURI	Day	38.1%	40.2%	34.2%	38.3%	33.8%	39.8%	37.6%	40.6%	36.3%	40.5%
	Night	22.1%	16.1%	25.8%	18.1%	17.8%	12.1%	17.6%	20.2%	17.4%	20.4%

State		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
MONTANA	Day	39.2%	30.6%	40.6%	36.7%	37.8%	36.4%	35.0%	38.7%	36.4%	38.0%
	Night	24.3%	14.6%	24.5%	16.3%	11.1%	17.2%	20.4%	14.8%	20.0%	14.1%
NEBRASKA	Day	31.4%	30.2%	36.9%	39.6%	36.8%	36.5%	51.9%	42.9%	41.2%	47.8%
	Night	13.7%	13.6%	15.7%	15.8%	16.7%	23.7%	14.3%	14.9%	22.2%	12.8%
NEVADA	Day	46.6%	44.1%	41.7%	37.5%	43.3%	42.3%	57.0%	52.1%	53.8%	56.6%
	Night	25.0%	41.5%	31.6%	25.6%	34.4%	39.3%	38.6%	32.8%	42.1%	28.3%
NEW HAMPSHIRE	Day	29.0%	38.5%	19.6%	42.9%	49.2%	28.1%	39.5%	38.8%	21.9%	28.3%
	Night	28.6%	8.7%	20.0%	22.7%	13.3%	33.3%	9.4%	13.8%	31.3%	21.1%
NEW JERSEY	Day	42.0%	41.2%	47.5%	45.9%	50.4%	54.5%	58.3%	60.3%	49.1%	60.2%
	Night	29.4%	24.3%	37.9%	34.7%	35.6%	42.4%	41.4%	44.8%	40.1%	40.2%
NEW MEXICO	Day	45.6%	48.0%	43.7%	50.9%	44.1%	38.8%	48.4%	57.1%	60.7%	49.4%
	Night	36.2%	24.7%	25.4%	25.3%	26.8%	25.9%	37.0%	46.3%	34.3%	30.2%
NEW YORK	Day	56.9%	50.8%	60.9%	62.5%	60.7%	65.0%	70.2%	67.1%	62.9%	67.4%
	Night	30.9%	34.4%	36.3%	39.1%	41.1%	41.9%	44.3%	41.2%	39.3%	54.5%
NORTH CAROLINA	Day	61.5%	58.1%	54.9%	57.7%	54.7%	63.3%	61.0%	56.8%	60.3%	59.9%
	Night	34.3%	34.3%	32.1%	34.7%	32.6%	40.2%	41.9%	42.4%	35.8%	40.6%
NORTH DAKOTA	Day	28.6%	49.0%	16.1%	35.2%	32.1%	26.7%	37.3%	27.1%	44.6%	44.7%
	Night	14.3%	12.5%	12.5%	7.7%	16.7%	13.6%	12.5%	10.0%	16.7%	22.6%
OHIO	Day	39.9%	44.8%	45.4%	46.1%	44.5%	46.6%	47.9%	49.7%	52.2%	49.4%
	Night	20.2%	23.7%	26.9%	19.7%	26.6%	22.7%	28.6%	28.6%	28.7%	23.1%
OKLAHOMA	Day	34.4%	38.4%	36.7%	35.0%	45.7%	45.1%	45.9%	46.2%	46.6%	51.2%
	Night	19.6%	29.3%	28.3%	25.0%	26.7%	21.2%	32.9%	30.1%	21.6%	27.8%
OREGON	Day	67.0%	59.3%	69.6%	64.6%	61.5%	67.8%	77.5%	74.6%	71.3%	66.1%
	Night	46.7%	40.4%	55.4%	48.2%	61.2%	60.9%	57.1%	59.0%	57.7%	66.7%
PENNSYLVANIA	Day	39.6%	39.7%	43.1%	40.7%	40.2%	43.5%	46.8%	44.8%	43.7%	45.6%
	Night	21.0%	19.6%	22.0%	20.2%	19.2%	28.7%	27.6%	23.7%	23.9%	24.6%
RHODE ISLAND	Day	25.0%	36.1%	26.7%	33.3%	19.4%	42.9%	35.7%	45.8%	34.8%	50.0%
	Night	0.0%	13.3%	17.6%	13.0%	37.0%	24.2%	26.7%	27.3%	12.5%	50.0%
SOUTH CAROLINA	Day	42.0%	39.9%	45.2%	40.3%	41.7%	41.4%	34.8%	38.6%	45.7%	41.7%
	Night	26.2%	28.5%	22.1%	20.5%	19.7%	18.1%	16.6%	20.7%	21.4%	23.0%
SOUTH DAKOTA	Day	36.6%	23.9%	22.5%	31.1%	39.1%	23.8%	36.4%	28.1%	24.7%	34.5%
	Night	24.0%	23.5%	0.0%	25.0%	16.7%	20.7%	18.8%	9.1%	7.7%	0.0%
TENNESSEE	Day	31.4%	29.2%	31.7%	34.8%	37.5%	39.8%	42.1%	45.6%	44.7%	44.1%
	Night	15.5%	20.9%	18.1%	20.2%	27.1%	21.7%	23.2%	22.9%	29.1%	29.3%
TEXAS	Day	54.1%	54.9%	57.3%	56.6%	61.7%	62.3%	65.3%	62.5%	61.8%	66.0%
	Night	34.7%	32.0%	38.8%	38.5%	39.0%	41.4%	47.0%	43.2%	45.0%	48.1%
UTAH	Day	37.7%	36.1%	43.2%	45.9%	49.7%	50.0%	44.8%	54.5%	69.9%	62.9%
	Night	10.8%	29.2%	20.4%	32.3%	28.6%	35.7%	29.6%	34.4%	26.5%	47.1%
VERMONT	Day	36.4%	30.0%	63.6%	50.0%	42.5%	52.9%	58.3%	44.8%	57.4%	67.7%
	Night	5.3%	40.0%	21.4%	31.3%	33.3%	57.1%	25.0%	33.3%	42.9%	0.0%
VIRGINIA	Day	43.5%	40.4%	44.4%	44.6%	41.7%	42.0%	49.4%	41.0%	47.1%	42.9%
	Night	25.2%	27.0%	29.2%	26.4%	24.5%	30.6%	27.6%	21.6%	22.4%	28.2%
WASHINGTON	Day	49.3%	49.1%	45.5%	53.8%	58.8%	65.6%	68.6%	60.8%	60.9%	66.8%
	Night	26.3%	26.7%	32.0%	31.3%	37.8%	54.8%	47.1%	49.6%	48.0%	50.0%
WEST VIRGINIA	Day	37.6%	42.9%	39.0%	35.3%	41.4%	45.7%	44.5%	43.2%	39.7%	48.7%
	Night	14.5%	17.3%	18.2%	26.5%	18.3%	24.6%	25.0%	26.4%	30.9%	29.4%
WISCONSIN	Day	47.2%	41.0%	46.9%	43.8%	45.0%	49.3%	48.5%	46.9%	52.1%	51.6%
	Night	17.9%	20.4%	21.2%	21.1%	21.4%	24.3%	23.5%	23.3%	24.4%	20.0%
WYOMING	Day	37.1%	25.9%	50.0%	32.0%	37.1%	44.1%	42.1%	37.3%	36.5%	46.3%
	Night	6.9%	16.7%	15.8%	22.2%	19.2%	12.5%	20.0%	18.2%	18.2%	16.0%
U.S.	Day	45.8%	45.2%	46.8%	48.1%	48.7%	51.3%	52.0%	51.5%	52.3%	53.5%
	Night	26.3%	26.5%	29.8%	29.3%	30.4%	32.3%	34.0%	34.3%	34.1%	35.0%

Appendix B. Binary Logistic Regression: Predictors of Belt Use – All Occupants

Predictor	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
SEX(1)	0.47	0.02	440.28	1	0.000	1.61	1.54	1.68
PRIMARY(1)	-0.68	0.03	662.60	1	0.000	0.50	0.48	0.53
DAYTIME(1)	-0.83	0.05	254.48	1	0.000	0.44	0.40	0.48
RUR_URBI(1)	0.18	0.03	44.92	1	0.000	1.20	1.14	1.26
AGE_45(1)	0.45	0.04	156.61	1	0.000	1.57	1.47	1.69
RD_IA_CL(1)	-0.50	0.03	254.91	1	0.000	0.61	0.57	0.64
VEH_SUVV			446.56	2	0.000			
VEH_SUVV(1)	0.49	0.04	160.66	1	0.000	1.64	1.52	1.77
VEH_SUVV(2)	0.80	0.04	375.15	1	0.000	2.22	2.04	2.40
WEEKEND(1)	0.08	0.03	9.42	1	0.002	1.09	1.03	1.14
AGE_45(1) by DAYTIME(1) by SEX(1)	-0.12	0.04	11.02	1	0.001	0.89	0.83	0.95
DAYTIME(1) by SEX(1) by WEEKEND(1)	0.10	0.04	6.64	1	0.010	1.10	1.02	1.19
DAYTIME(1) by PRIMARY(1) by RUR_URBI(1)	0.18	0.03	30.22	1	0.000	1.20	1.12	1.28
AGE_45(1) by DAYTIME(1) by PRIMARY(1)	-0.13	0.04	12.96	1	0.000	0.88	0.81	0.94
DAYTIME(1) by PRIMARY(1) by RD_IA_CL(1)	0.07	0.03	4.20	1	0.040	1.07	1.00	1.15
AGE_45(1) by DAYTIME(1) by RUR_URBI(1)	-0.17	0.04	19.00	1	0.000	0.84	0.78	0.91
DAYTIME(1) by RD_IA_CL(1) by RUR_URBI(1)	-0.26	0.04	44.74	1	0.000	0.77	0.72	0.83
DAYTIME * RUR_URBI * VEH_SUVV			13.72	2	0.001			
DAYTIME(1) by RUR_URBI(1) by VEH_SUVV(1)	-0.18	0.05	12.83	1	0.000	0.83	0.75	0.92
DAYTIME(1) by RUR_URBI(1) by VEH_SUVV(2)	-0.09	0.06	2.72	1	0.099	0.91	0.82	1.02
DAYTIME(1) by RUR_URBI(1) by WEEKEND(1)	-0.07	0.04	3.45	1	0.063	0.93	0.86	1.00
AGE_45(1) by DAYTIME(1)	0.54	0.07	64.32	1	0.000	1.72	1.51	1.96
AGE_45(1) by DAYTIME(1) by RD_IA_CL(1)	-0.08	0.04	3.73	1	0.053	0.93	0.85	1.00
AGE_45(1) by DAYTIME(1) by WEEKEND(1)	0.15	0.04	14.11	1	0.000	1.16	1.07	1.25
DAYTIME(1) by RD_IA_CL(1)	0.21	0.05	13.96	1	0.000	1.23	1.10	1.37
DAYTIME * RD_IA_CL * VEH_SUVV			17.98	2	0.000			
DAYTIME(1) by RD_IA_CL(1) by VEH_SUVV(1)	-0.19	0.05	13.65	1	0.000	0.83	0.75	0.91
DAYTIME(1) by RD_IA_CL(1) by VEH_SUVV(2)	-0.15	0.05	8.93	1	0.003	0.86	0.77	0.95
DAYTIME(1) by RD_IA_CL(1) by WEEKEND(1)	-0.10	0.04	7.45	1	0.006	0.90	0.84	0.97
DAYTIME * VEH_SUVV			13.06	2	0.001			
DAYTIME(1) by VEH_SUVV(1)	0.23	0.07	11.22	1	0.001	1.26	1.10	1.45
DAYTIME(1) by VEH_SUVV(2)	0.15	0.07	4.27	1	0.039	1.16	1.01	1.35
Constant	0.26	0.05	24.88	1	0.000	1.30		

Appendix C. Binary Logistic Regression: Predictors of Belt Use – Drivers

Predictor	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
DAYTIME(1)	0.17	0.09	3.34	1	0.067	1.19	0.99	1.43
SEX(1)	0.42	0.04	102.52	1	0.000	1.52	1.40	1.64
ATFAULT(1)	1.34	0.05	613.94	1	0.000	3.82	3.43	4.25
SUSP_YN(1)	-0.42	0.05	86.92	1	0.000	0.65	0.60	0.71
MV_YN(1)	-0.25	0.04	37.68	1	0.000	0.78	0.72	0.84
AGE_45(1)	0.19	0.04	24.77	1	0.000	1.21	1.12	1.30
DAYTIME(1) by SEX(1)	-0.31	0.09	10.34	1	0.001	0.74	0.61	0.89
ACC_YN(1) by DAYTIME(1) by SEX(1)	0.12	0.06	4.33	1	0.037	1.13	1.01	1.26
DAYTIME(1) by SEX(1) by SPD_YN(1)	0.23	0.06	15.90	1	0.000	1.26	1.12	1.41
DAYTIME(1) by MV_YN(1) by SEX(1)	0.11	0.06	3.43	1	0.064	1.12	0.99	1.26
AGE_45(1) by DAYTIME(1) by SEX(1)	-0.07	0.04	2.72	1	0.099	0.93	0.85	1.01
ATFAULT(1) by DAYTIME(1)	-0.65	0.07	97.27	1	0.000	0.52	0.46	0.59
AGE_45(1) by ATFAULT(1) by DAYTIME(1)	0.25	0.05	22.99	1	0.000	1.28	1.16	1.42
ACC_YN(1) by DAYTIME(1) by SUSP_YN(1)	-0.15	0.05	8.32	1	0.004	0.86	0.77	0.95
DAYTIME(1) by SUSP_YN(1)	0.86	0.25	12.43	1	0.000	2.37	1.47	3.84
DAYTIME(1) by DWI_YN(1) by SUSP_YN(1)	-0.68	0.22	9.61	1	0.002	0.50	0.33	0.78
DAYTIME(1) by SPD_YN(1) by SUSP_YN(1)	-0.19	0.07	6.57	1	0.010	0.83	0.72	0.96
DAYTIME(1) by MV_YN(1) by SUSP_YN(1)	-0.11	0.06	3.29	1	0.070	0.90	0.80	1.01
AGE_45(1) by DAYTIME(1) by SUSP_YN(1)	0.14	0.05	6.61	1	0.010	1.15	1.03	1.28
DAYTIME(1) by DWI_YN(1) by SPD_YN(1)	-0.24	0.07	11.30	1	0.001	0.79	0.69	0.91
Constant	-0.43	0.08	27.84	1	0.000	0.65		

Appendix D. Binary Logistic Regression: Predictors of Belt Use – Alcohol

Predictor	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
DAYTIME(1)	-0.35	0.09	16.32	1	0.000	0.70	0.59	0.83
SEX(1)	0.29	0.07	18.78	1	0.000	1.33	1.17	1.52
PRIMARY(1)	-0.76	0.06	169.02	1	0.000	0.47	0.42	0.52
ROADTYPE(1)	-0.42	0.06	48.79	1	0.000	0.66	0.59	0.74
VEHTYPE			82.69	2	0.000			
VEHTYPE(1)	0.45	0.07	39.21	1	0.000	1.57	1.37	1.81
VEHTYPE(2)	0.61	0.08	62.46	1	0.000	1.84	1.58	2.15
AGE_45(1)	0.29	0.06	22.42	1	0.000	1.34	1.19	1.51
SUSP_YN(1)	0.43	0.08	25.19	1	0.000	1.53	1.30	1.81
OTH_YN(1)	0.36	0.08	19.46	1	0.000	1.43	1.22	1.68
ATFAULT(1)	0.78	0.09	77.98	1	0.000	2.18	1.83	2.59
ALC_08(1)	0.73	0.09	60.81	1	0.000	2.08	1.73	2.50
ALC_08(1) by DAYTIME(1) by SEX(1)	0.33	0.14	5.78	1	0.016	1.39	1.06	1.82
ALC_08(1) by DAYTIME(1) by OTH_YN(1)	-0.35	0.20	3.07	1	0.080	0.70	0.48	1.04
Constant	-0.62	0.14	20.77	1	0.000	0.54		

Appendix E. Binary Logistic Regression: Predictors of Belt Use – Conversion States

Predictor	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
DAYTIME(1)	-0.47	0.04	168.48	1	0.000	0.62	0.58	0.67
SEX(1)	0.51	0.03	248.46	1	0.000	1.67	1.57	1.78
PREPOST(1)	0.50	0.03	260.26	1	0.000	1.64	1.55	1.74
RUR_URB(1)	-0.13	0.03	16.44	1	0.000	0.88	0.82	0.93
ROADTYPE(1)	-0.43	0.03	168.83	1	0.000	0.65	0.61	0.69
VEHTYPE			357.16	2	0.000			
VEHTYPE(1)	0.49	0.04	133.77	1	0.000	1.63	1.50	1.77
VEHTYPE(2)	0.78	0.05	283.70	1	0.000	2.18	1.99	2.39
AGE_45(1)	0.70	0.03	466.56	1	0.000	2.00	1.88	2.13
WEEKEND(1)	0.08	0.03	5.28	1	0.022	1.08	1.01	1.15
Constant	-0.32	0.06	30.17	1	0.000	0.73		

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