

## FACT SHEET

# AAA Foundation for Traffic Safety

Saving lives through research and education

## Acute Sleep Deprivation and Risk of Motor Vehicle Crash Involvement

### Background

- Experts recommend that healthy adults should sleep for 7-9 hours daily; teens and young adults, people who are ill, and people who are recovering from sleep debt may require more sleep (National Sleep Foundation; American Academy of Sleep Medicine & Sleep Research Society)
  - The Bureau of Labor Statistics shows that approximately 18% of adults in the United States sleep for less than 7 hours in a given 24-hour period, including 2% who sleep for less than 4 hours
  - The Centers for Disease Control & Prevention indicates that 35% of adults in the United States usually sleep less than 7 hours, including 12% who report that they usually sleep less than 5 hours
- Sleep deprivation slows reactions to stimuli, decreases accuracy of responses, and leads to long lapses in attention
- Previous AAA Foundation for Traffic Safety research has estimated that 7% of all crashes in which a vehicle was towed from a scene, 13% of all crashes that result in hospital admission, and 16-21% of all fatal crashes involve a drowsy driver
- There is little scientific research that measures the relationship between specific amounts of sleep deprivation and crash risk amongst the general driving population

### Overview

- This study is the first to quantify the relationship between specific measures of recent sleep and the risk of crash involvement in a representative sample of crashes of the general driving population
- Data was examined from the National Highway Traffic Safety Administration's National Motor Vehicle Crash Causation Survey, which consisted of a representative sample of police-reported crashes that:
  - Occurred in the US between July 2005 and December 2007, from 6:00 AM-11:59 PM
  - Involved at least one car, pickup truck, van, minivan, or sport utility vehicle that was towed from the scene due to damage
  - Resulted in an emergency medical service dispatch
- Crashes were investigated on-scene by multidisciplinary teams of specially-trained investigators (independent of routine investigations by law enforcement officers)
- Investigations included an assessment of factors that contributed to the crash (errors committed by drivers, vehicle mechanical failures, environmental conditions) as well as an assessment of how many hours the driver had slept in the 24 hours before the crash, usual daily amount of sleep, and whether the driver had changed their sleep schedule recently
- The relationship between sleep deprivation and crash risk was assessed by comparing the amount of sleep reported by drivers who on-scene crash investigators found to have contributed to the crash by means of an unsafe or illegal action, inaction, or error, to the amount of sleep reported by drivers who investigators found not to have contributed to the crash in such a manner
  - Drivers who were involved in crashes but did not contribute to the crashes by any action, inaction, or error on their part were assumed to represent a random sample of all drivers on the road when and where crashes occurred, thus
    - The amounts of sleep reported by these drivers provide a sample of the sleep of all drivers on the road, and
    - Differences in the amounts of sleep of drivers who contributed to crashes vs. non-contributing drivers provide estimates of the relationship between sleep and rates of crash involvement

## Key Findings

- Results of this study indicate that there is a significantly elevated crash risk for:
  - Drivers who slept for less than 7 hours in the past 24 hours
  - Drivers who slept for 1 or more hours less than they usually sleep (independent of how much they usually sleep)
- Compared to drivers who had slept for at least 7 hours in the past 24 hours, drivers who reported they had slept:
  - 6-7 hours had 1.3 times the crash rate
  - 5-6 hours had 1.9 times the crash rate
  - 4-5 hours had 4.3 times the crash rate
  - Less than 4 hours had 11.5 times the crash rate
- Drivers who reported that they usually sleep for 4-5 hours per day had 5.4 times the crash rate of drivers who usually sleep for 7 hours or more daily
- Compared to drivers who reported that they had slept at least their usual amount in the past 24 hours, drivers who reported they had slept:
  - 1-2 hours less than usual had 1.3 times the crash rate
  - 2-3 hours less than usual had 3.0 times the crash rate
  - 3-4 hours less than usual had 2.1 times the crash rate
  - 4 or more hours less than usual had 10.2 times the crash rate
- Some limitations include:
  - Data on sleep was self-reported
  - Some estimates were imprecise due to limited sample size (very few drivers who did not contribute to crashes reported sleeping for less than 5 hours)
  - The study could not control for use of drugs or alcohol
  - The data analyzed for this study did not include crashes that occurred between midnight and 6 AM. Thus, this study may underestimate the crash risk associated with sleep deprivation, because other studies suggest that both the prevalence and the effect of sleep deprivation may be greater during these hours

## Conclusions

- A National Sleep Foundation consensus working group concluded that individuals who have slept 2 hours or less within a 24-hour period are not fit to operate a vehicle; the results of this current study support that recommendation, and further suggest that individuals who have slept for less than 4 or 5 hours in the past 24 hours are likely to be substantially impaired
- The estimated crash risk associated with driving after only 4-5 hours of sleep compared with 7 hours or more is similar to the National Highway Traffic Safety Administration's estimates of the crash risk associated with driving with a blood alcohol concentration (BAC) equal to or slightly over the legal limit for alcohol in the US (0.08), and the crash risk associated with having slept less than 4 hours of sleep is comparable to the crash risk associated with a BAC of roughly 0.12-0.15



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