Sleepiness: How a biological drive can influence other risky road user behaviours

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Outline

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• Effects of Sleepiness
• Sleepiness and other Risky Road Behaviours
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Introduction

- The ‘fatal five’ continue to be major causes of road trauma
- Driver sleepiness is relatively unregulated among non-professional drivers
- Strongest evidence (case-control data) suggests that 19% of all fatal and severe crash are due to sleepiness
- Crashes often have multifactorial causes, and sleepiness may contribute to crashes that were primarily attributed to other factors

Introduction

- The causes of sleepiness are numerous
- Sleep deprivation leads to a sleep debt and to daytime sleepiness
  - Acute/partial (1-4 hrs deprivation of sleep duration)
  - Total (no sleep)
  - Chronic (repeated long-term deprivations)
  - Shift work
  - Sleep disorder
  - Life circumstances (newborn, stress, work)
- Sleepiness is a state that most, if not all drivers have experienced, and are habitually exposed too
Societal Sleepiness

• Sleep disruption, sleep disorders, poor sleep habits, and daytime sleepiness is increasing
  – A fifth of Australians sleep less than 6.5 hrs/night
  – Chronic daytime sleepiness occurs in 11.7% of Australians
  – 9.8% of younger Australians (18-24 years) report chronic daytime sleepiness levels
• Sleeping < 7 hrs/night leads to lowers levels of personal wellbeing
• Two fifths of individuals fall asleep at work from excessive daytime sleepiness

Effects of Sleepiness

• Sleepiness has detrimental impact on a number of psychological processes:
  – The ability to maintain alertness
  – Efficient and precise cognitive functioning
  – Accurate risk-perceptions
  – Impulse control
  – Swift reaction times
  – Emotional regulation and interpersonal communication
• Blood Alcohol Content (BAC) comparisons
  – 17-19 hours awake ≈ BAC of 0.05%
  – > 24 hours awake ≈ BAC of 0.1%
Effects of Sleepiness

Sleepiness & other Risky Road Behaviours

- Sleepiness impairs a number of psychological process that are important for safe driving
- Many of these psychological process are also involved with other risky road behaviours
- The potential causes for risky driving behaviours are numerous and complicated
  - attitudes, personality, risk perceptions, etc
- The effects from sleepiness are present from the moment of awakening
Sleepiness & Drink Driving

- Sleepiness and alcohol produces levels of impairment that are greater than the impairment from either sleep deprivation or alcohol alone
  - Combining 5 hrs of sleep and a BAC < .04%, leads to more microsleeps and poorer vehicle control
  - Effects are still present when BAC levels are near to zero
- Majority of alcohol-related crashes and BAC apprehensions occur between 01:00-04:00
- Substantial increases of the odds of crashing when acutely sleepy and alcohol

Sleepiness and Speeding

- Sleepiness effects the ability to adequately control a vehicle
- Sleepiness leads to increases and decreases of speed variability
- The magnitude of the variations increases with longer driving durations
- Some sleepy drivers will purposefully speed to facilitate an increase of arousal levels
- **Multiplicative effects from**
  - Sleepiness: impaired cognitions and slower reaction times
  - Speeding: less time to react
Sleepiness and Distracted Driving

- Sleepiness affects the ability to maintain attention and limits the ability to filter task irrelevant stimuli
- Sleepy drivers divert their gaze more leading to more distraction-related driving incidents
- Sleepiness + BAC < .05 + mobile usage leads to impaired driving performance
- Distractibility increases with longer driving durations
- Likely due to seeking novel stimuli to increase arousal levels

Sleepiness and Aggression

- Emotional regulation and interpersonal functioning are compromised by sleepiness
- Sleepiness leads to greater emotional reactivity to neutral and negative stimuli
- Sleepy individuals are more reactive to low levels of stress and use poorer coping skills with stressful situations
- Impulse control is impaired with sleepiness when responding to negative stimuli compared to positive stimuli
Sleepiness and Young People

• Younger drivers are more critically affected by sleepiness
• Younger persons show greater impairments of vigilance, vehicle control, and hazard perception skills when sleepy than older drivers
• Younger drivers hold erroneous risk perceptions of the dangerousness of sleepy driving
• Younger drivers:
  – Frequently drive during times of high sleepiness
  – Have greater sleep debts before a long drive
  – Less likely to use sleepiness countermeasures

Protective Factors

• Increasing total sleep time
  – Increasing sleep time (7 to 8-9 hrs) improves daytime alertness, neurobehavioural performance, and mood
  – Longer sleep times can potentially buffer the impairments from sleep deprivation
• Improving sleep quality
• Regularising of sleep-wake times
  – Increases mood, daily functioning, and sleep quality
  – Regular sleep-wake times can buffer the impairments from sleep deprivation
• Sleep education programs are effective
Conclusion

• Driver sleepiness contributes substantially to road trauma
• The effects from sleepiness are profound and far reaching
• Current data suggests that societal sleepiness is increasing
• Sleepiness is a state that most, if not all drivers have experienced, and are habitually exposed too
• Reductions of sleepiness might lead to reductions of other risky driving behaviours

Thank you for listening!

Comments or Questions?

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"I'm not asleep... but that doesn't mean I'm awake."

(Unknown Author)