



# Can we convince tired drivers to take a break from driving?

Never Stand Still

Science

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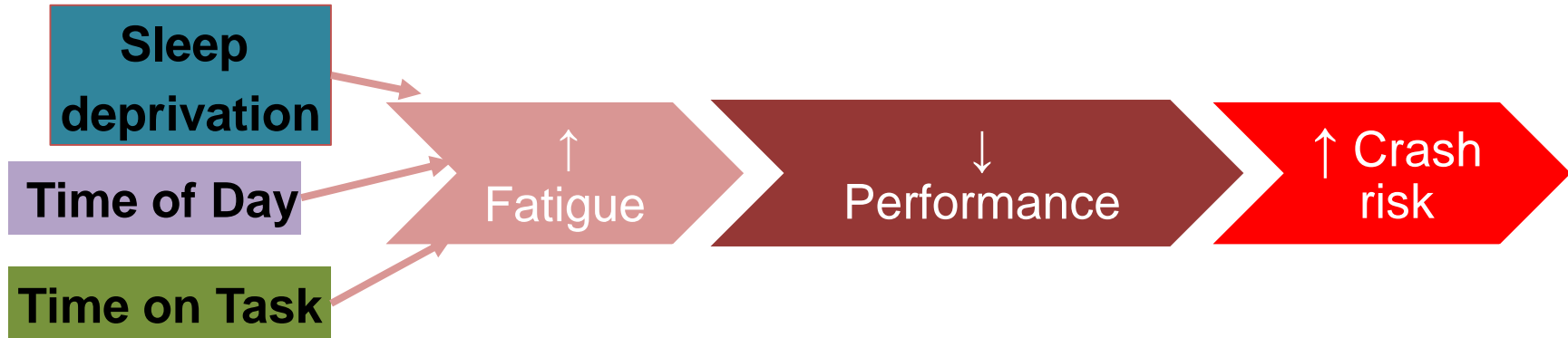
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# Relationship: fatigue and crashing

## Driver fatigue:

- accounts for a significant proportion of fatal crashes
- **Current countermeasures involve guidance to drivers**

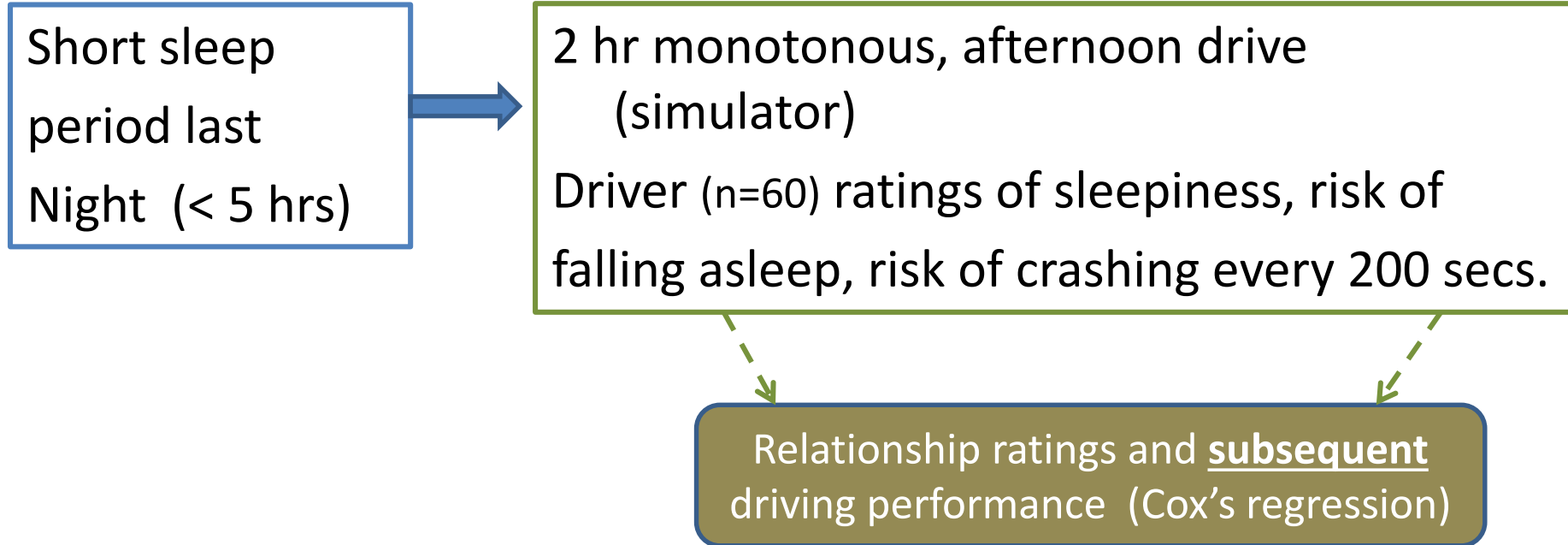


# Guidance-based fatigue countermeasures focus on:

- Advice to drivers on the fatigue experience and when to rest when they experience fatigue
- **?** But do drivers have insight into their fatigue to be able to stop and rest prior to crashing?



# Study 1: Can drivers tell when too tired to drive?



\* Williamson, Friswell, Grzebieta, Olivier and Zeller (2014)

# Results: Drivers are aware of increasing fatigue while driving

## Driver predictions of:

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Falling asleep in next few minutes



- $\geq 4$  times more likely to crash,
  - 9 times more likely to cross centreline
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Sleepiness



- 10 times more likely to cross centrelines
- 

Crash likelihood

Not so accurate

# Conclusion

- Drivers are aware of sleepiness, and likelihood of falling asleep **before** safety-related outcomes occur.
- Drivers **can** make an informed decision about the safety of their driving when fatigued.

So:

- ? Why do fatigue-related crashes continue to occur?
- ? If drivers know they are tired, why don't they do something about it?

# Current Study Aim

- To investigate whether drivers can be motivated to increase break-taking in response to fatigue

## Study design:

- In a simulator, three groups of drivers:
  - Incentive for safe performance, or
  - Incentive for trip completion, or
  - No incentives.

# Study design

Fatigue induction (all groups) = short prior sleep (5hrs), test - afternoon, monotonous country drive scenario

	Safety incentive	Time incentive	No incentive
Reimbursement at completion of two hour drive	\$100	\$100	\$100
BUT...	Lose \$20 for any crash, drive off-road, centreline crossings	Lose \$20 for each minute over two hours to complete the drive	-
No. participants	30	30	30



# Study measures

- Driving performance:
  - Crashes,
  - Centreline crossings, lane departures, lane edge touches, variability of lane position
- Subjective ratings (made every 200 secs):
  - Sleepiness
  - Likelihood of falling asleep
  - Likelihood of crashing
- Drowsiness
  - Optalert (JDS)

## Participants

n = 30 participants per group

63.7% male

Mean age = 26.4yrs  
(range 20-60yrs)

## Procedure

- Practice drive
- Validation of sleep reduction by actigraph
- Drive commenced 14:30hr
- Duration = 1:59hr at posted speed limits (80, 100, 110kph)
- Ratings prompted by tone every 200 secs
- = 35 across drive

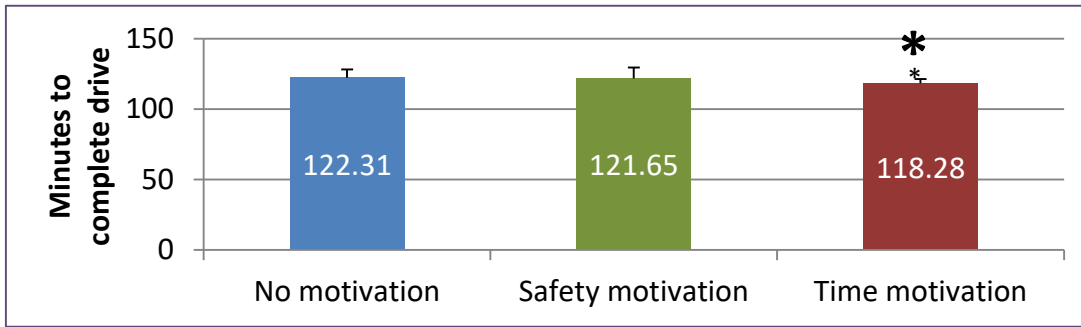
# Results: sleepiness manipulation

	Mean (sd)	Diff between groups
Actual sleep hours	4.49h (0:56)	ns
Sleep quality rating (/100)	57.8 (23.9)	ns
Hrs since waking at start of drive	7:25 (1:21)	ns
Mean highest KSS rating	7.56 (1.69)	ns
Highest Optalert score	3.10 (1.70)	ns
Participants reporting falling sleep	35.6%	ns

# The Drive

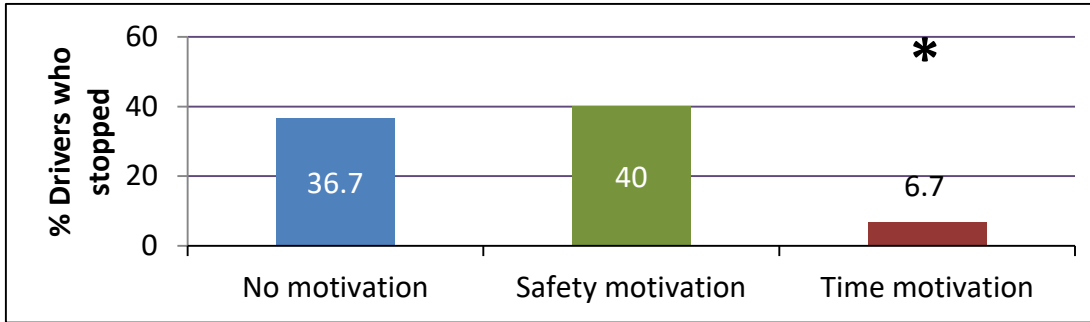
Time to complete drive:

- Time group faster than no motivation group



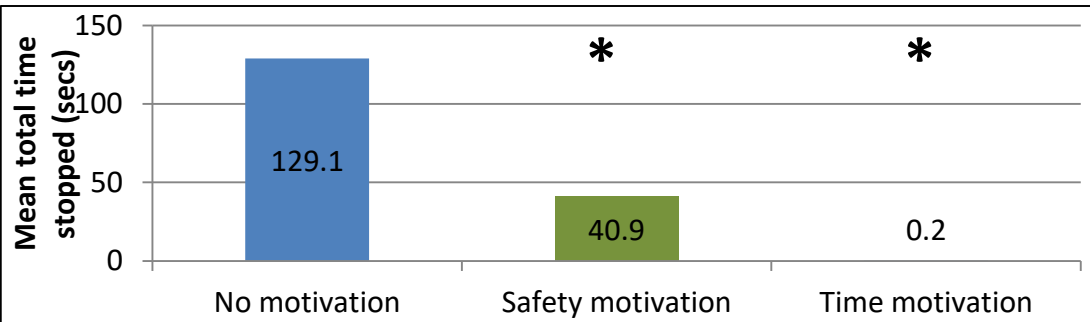
% drivers who stopped

- Fewer Time group stopped than either other group

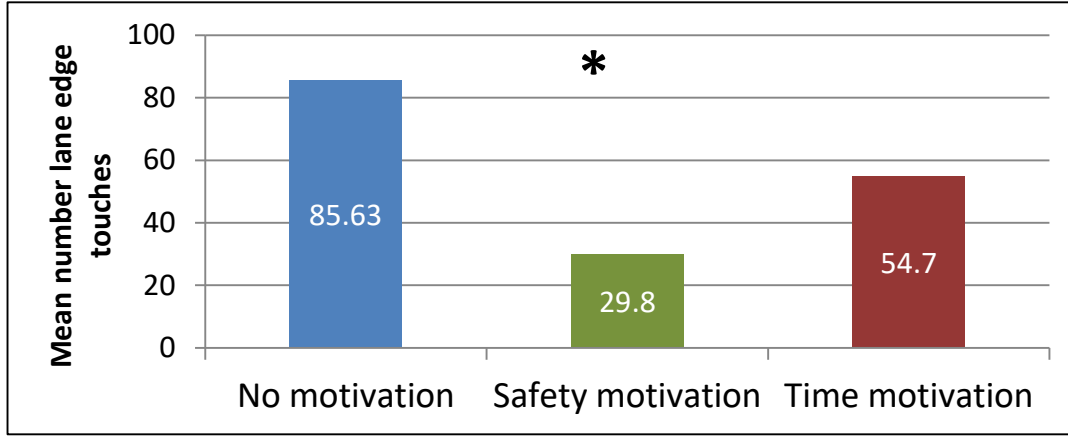


Mean total time stopped

- Both motivation groups stopped for shorter period than no motivation group

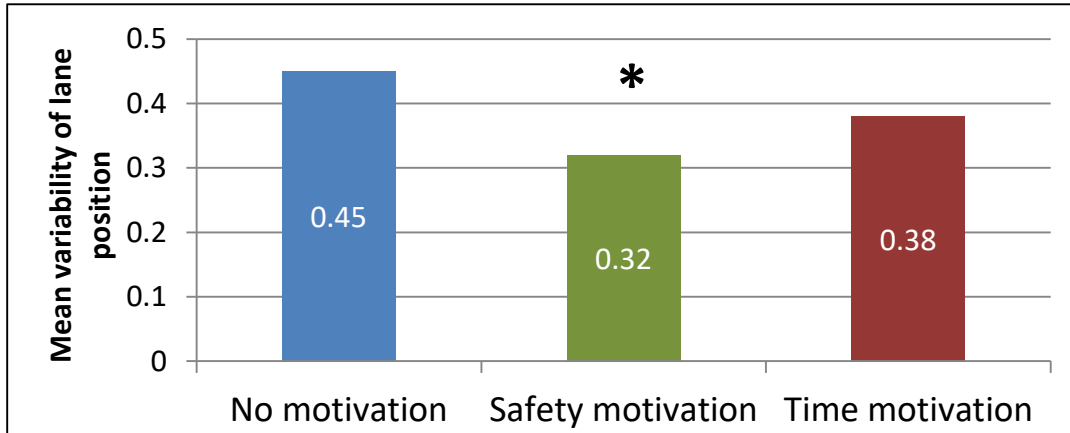


# Driving Performance



## Lane edge touches

- Fewer edge touches for Safety Motivation than No motivation



## Variability of lane position

- Safety Motivation less variable than No motivation



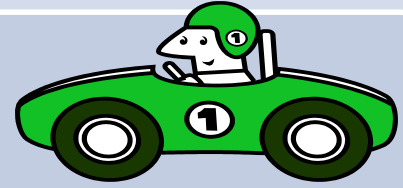
## Time

- \* Completed trip faster
- \* No or few short breaks
- \* Driving performance poor



## Safety

- \* Trip longer (but by small margin)
- \* More/longer breaks
- \* Best driving performance



## No Incentive

- \* Highest trip duration
- \* Stopped most/longest
- \* Poorest performance

## Summary of results

- All groups reached same levels of fatigue during the drive
- Safety incentives group significantly improved driving performance
  - due to drivers taking strategic rest breaks (?)
  - (without significant cost to time in the trip)

# Can drivers be motivated to take more breaks when fatigued?

**YES,** if we provided incentives to do it.



# So what?..... We need to.....

1. Change the message to road users about fatigue
  - Emphasise the need to avoid the consequences of feeling fatigue and make safe decisions (similar to decision to not speeding or drink-driving)
2. Vigorously enforce penalties for crashes and incidents shown to involve fatigue
  - Increase motivation to comply
3. Explore the strategic use of technology in enhancing enforcement

People **can** be motivated to respond to the signs of fatigue and driving performance improves...

So why don't we do it?



# Thank you



*"Unfortunately, there's no law against driving after doing triple shifts."*