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

Never Stand Still | Science

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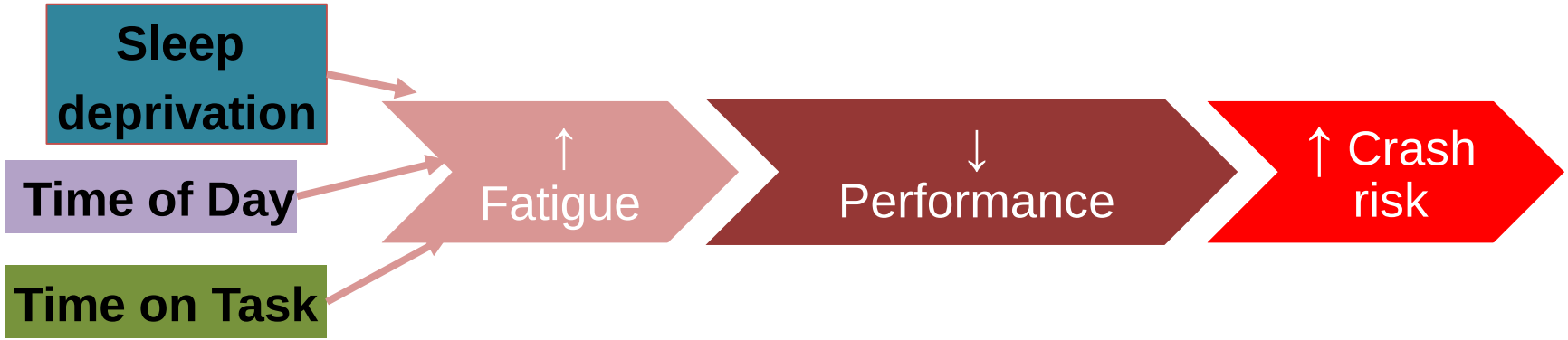
TARS Research

Relationship: fatigue and crashing

Driver fatigue:

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

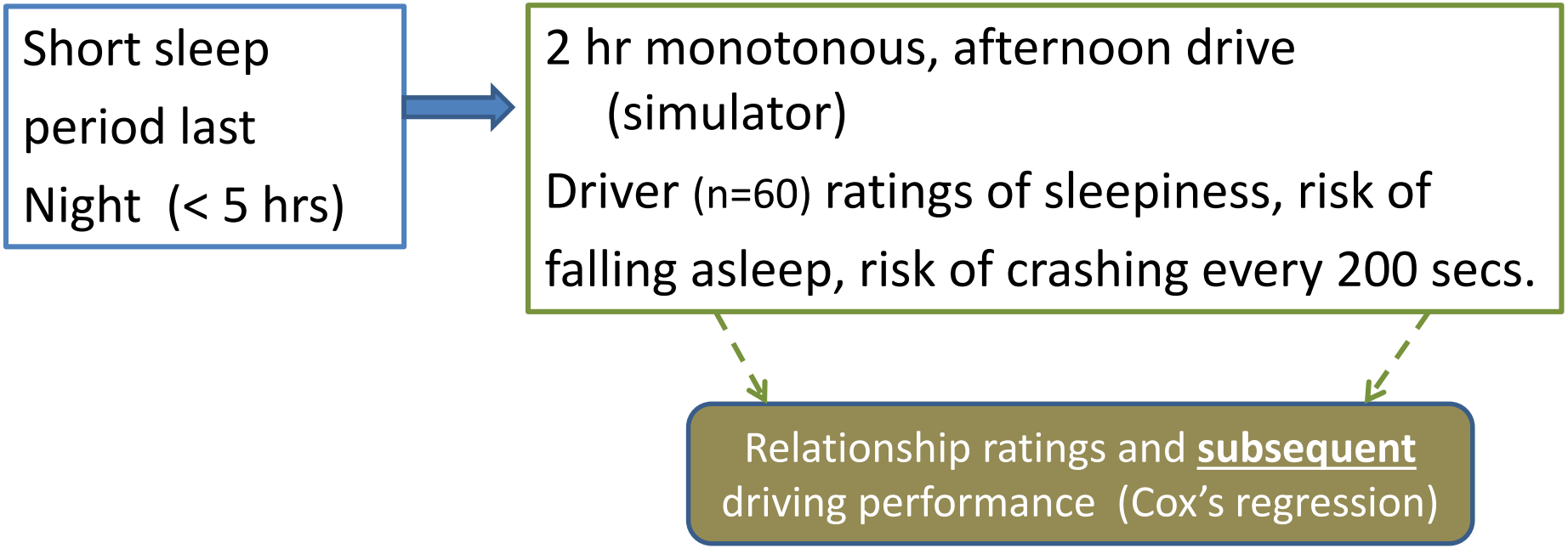


Guidance-based fatigue countermeasures focus on:

- 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:		
Falling asleep in next few minutes	→	○ ≥ 4 times more likely to crash, ○ 9 times more likely to cross centreline
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)

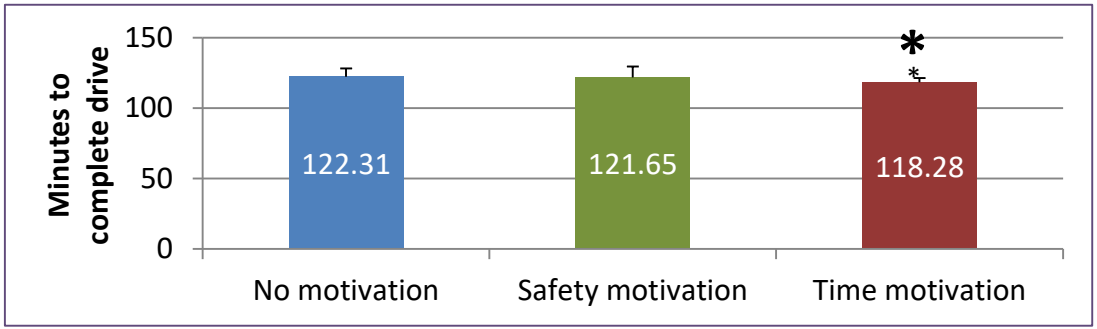
Procedure

- 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

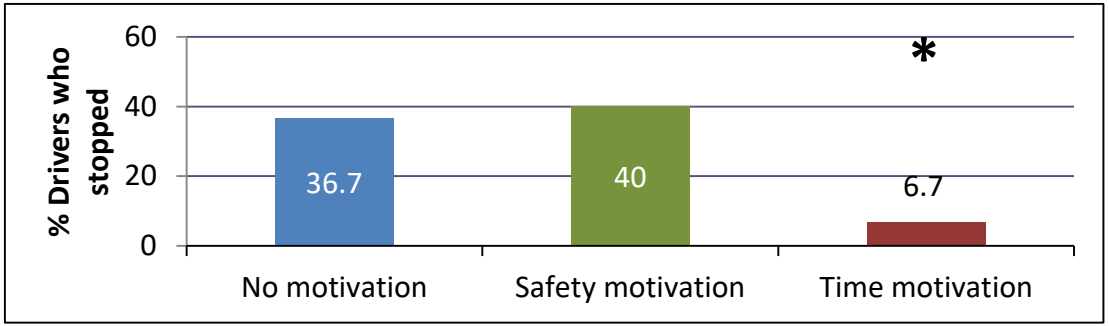
	Mean (sd)	Diff between groups
Actual sleep hours	4.49h (0:56)	ns
Sleep quality rating (/100)	57.8 (23.9)	ns
Hrs since waking at start of drive	7:25 (1:21)	ns
Mean highest KSS rating	7.56 (1.69)	ns
Highest Optalert score	3.10 (1.70)	ns
Participants reporting falling sleep	35.6%	ns

The Drive



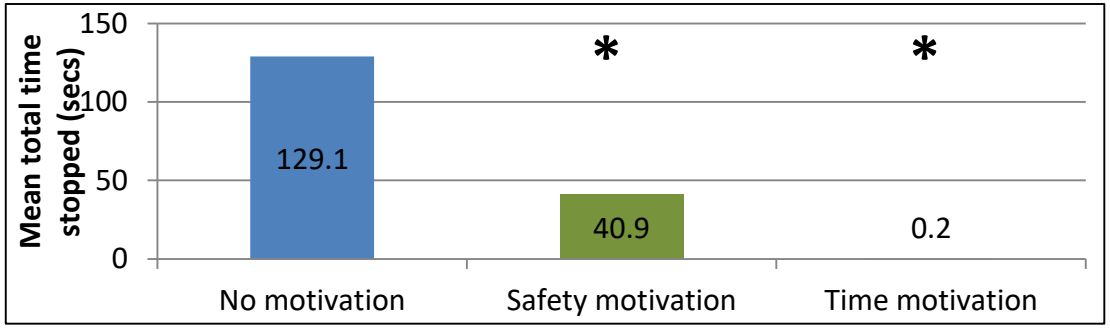
Time to complete drive:

- Time group faster than no motivation group



% drivers who stopped

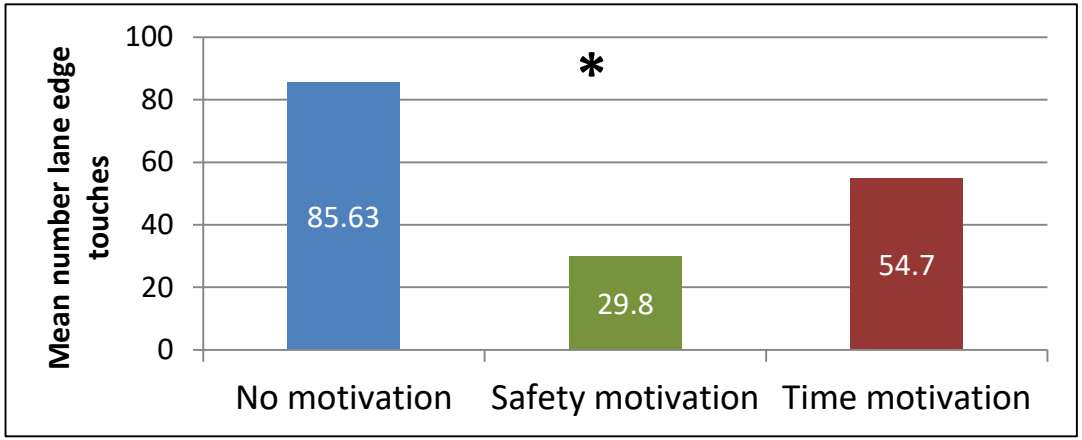
- Fewer Time group stopped than either other group



Mean total time stopped

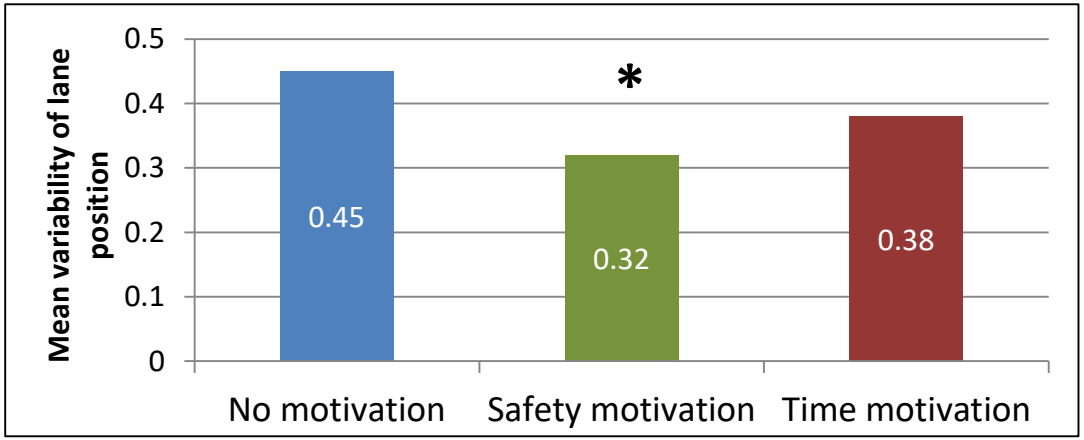
- Both motivation groups stopped for shorter period than no motivation group

Driving Performance



Lane edge touches

- Fewer edge touches for Safety Motivation than No motivation



Variability of lane position

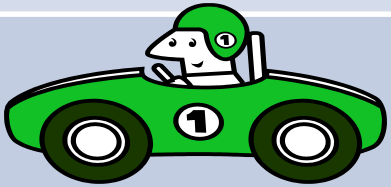
- Safety Motivation less variable than No motivation

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."