



THE UNIVERSITY  
*of* ADELAIDE  
CENTRE FOR AUTOMOTIVE  
SAFETY RESEARCH



CRICOS PROVIDER 00123M

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# Potential effectiveness of seat belt interlocks

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*seek* LIGHT

# Background

- Adelaide Thinker in Residence (2010): Professor Fred Wegman
  - Recommendation to aim for 100% restraint use
  - Investigate seat belt interlocks as part of a New Vehicle Technologies Forum
- SA Road Safety Action Plan 2011-2012:

## Technology

- > Establish a Road Safety Technologies Forum to lead, coordinate and investigate feasibility trials of the following technologies: (RAA, MAC, CASR & DTEI)
  - > dedicated short range communication systems
  - > seatbelt interlocks
  - > e-call technology for automated alert of emergency services to rural and remote crashes.



**Government of South Australia**  
Department of Planning,  
Transport and Infrastructure

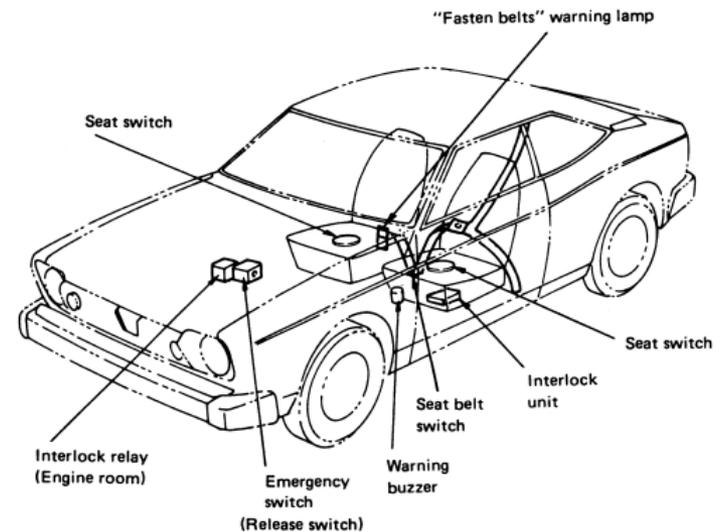
# The problem

- In seat belt surveys: ~2% unrestrained
- In fatal accidents: ~30% unrestrained
- Many contributing factors
- Unrestrained → restrained can halve the risk of fatality or serious injury



# Seat belt interlocks

- Vehicle cannot be started unless seat belt is buckled
- Less stringent systems may:
  - delay engine start
  - restrict gears
  - restrict speed
- Can use existing hardware from seat belt reminders



# US 1974 experience

- Seat belt interlocks were mandatory in the US in 1974
- Law was repealed following widespread public backlash
- Belt usage went from 25% to 59% in MY1974 vehicles

**NEW SAFETY REQUIREMENT**  
according to Federal Motor Vehicle Safety Standard No. 208, Section 7.4  
**FOR ADDED SAFETY, this 1974 model is equipped with an Ignition Switch/Safety Belt Interlock.**

- 1. What is the interlock?**  
Engine ignition and safety belt system for the front seats are interconnected.  
To start the engine, follow these steps:  
- SIT DOWN  
- BUCKLE UP  
- TURN KEY  
Otherwise the engine cannot be started.
- 2. What happens if the engine stalls?**  
Keep belts on!  
Turn the key back to the "off" position and restart the engine.
- 3. What happens if driver or front passenger take off belts while driving?**  
Engine will not stop. Warning light and buzzer will remind driver and passenger to buckle up again.
- 4. How sensitive is the seat switch?**  
Shopping bags, heavy packages or pets on the seat will actuate the warning system.  
Engine cannot be started until seat is cleared.
- 5. What about parking lot attendants?**  
The car can be started, without buckling up, within 3 minutes after the engine has been shut off. However, the warning system will be actuated.
- 6. IMPORTANT REMINDER!**  
**NEVER attempt to defeat the Interlock!**  
If you tamper with the Interlock, you may not be able to start the engine, or the car may become inoperative.



# Aims

- To estimate the potential future effectiveness of a mandatory seat belt interlock requirement
- Account for model turn over and the vehicle age profile of unrestrained drivers

# Method

- Determined vehicle age profile of unrestrained drivers
- Assumed a linear introduction rate of interlocks into new vehicles between 2015 and 2010
- Calculated the year-by-year casualty reductions

# Method: effectiveness estimate

Casualty reduction for a given year

=

Proportion of injured drivers who would usually be unrestrained

×

Proportion of otherwise unrestrained drivers who are in  
interlock equipped vehicles

×

50% seat belt effectiveness at preventing a fatality or serious  
injury (Elvik, 2009)

×

95% seat belt interlock effectiveness at converting unrestrained  
to restrained (assumed)

# Method: data sources

- Three sources of **restraint use** and **vehicle age** data:

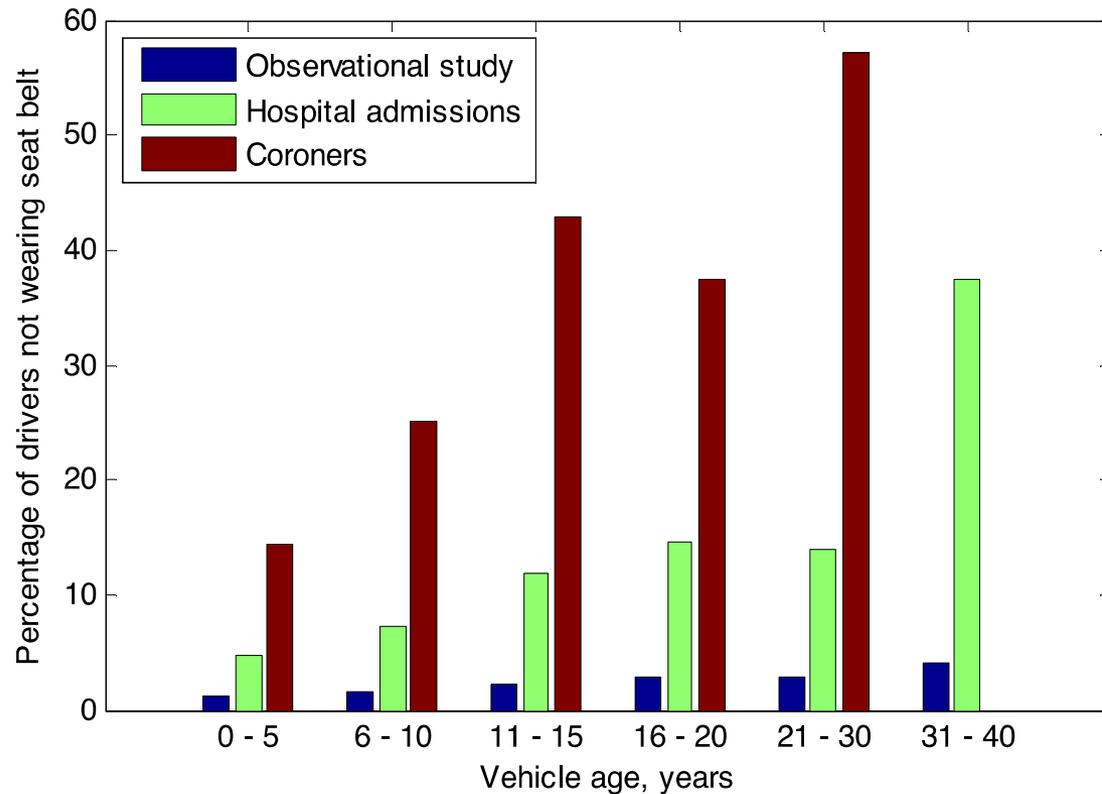
Injury severity	Period	Data source	Restraint use
None	2009	Observational study in rural and metro SA, matched to vehicle registration data	98%
Hospital admitted (but not fatal)	2008-2010	Hospital admission data from the Royal Adelaide Hospital, matched to police reported crash data	89%
Fatal	2008	South Australian Coroner's files	66%

- Notes: we only considered drivers

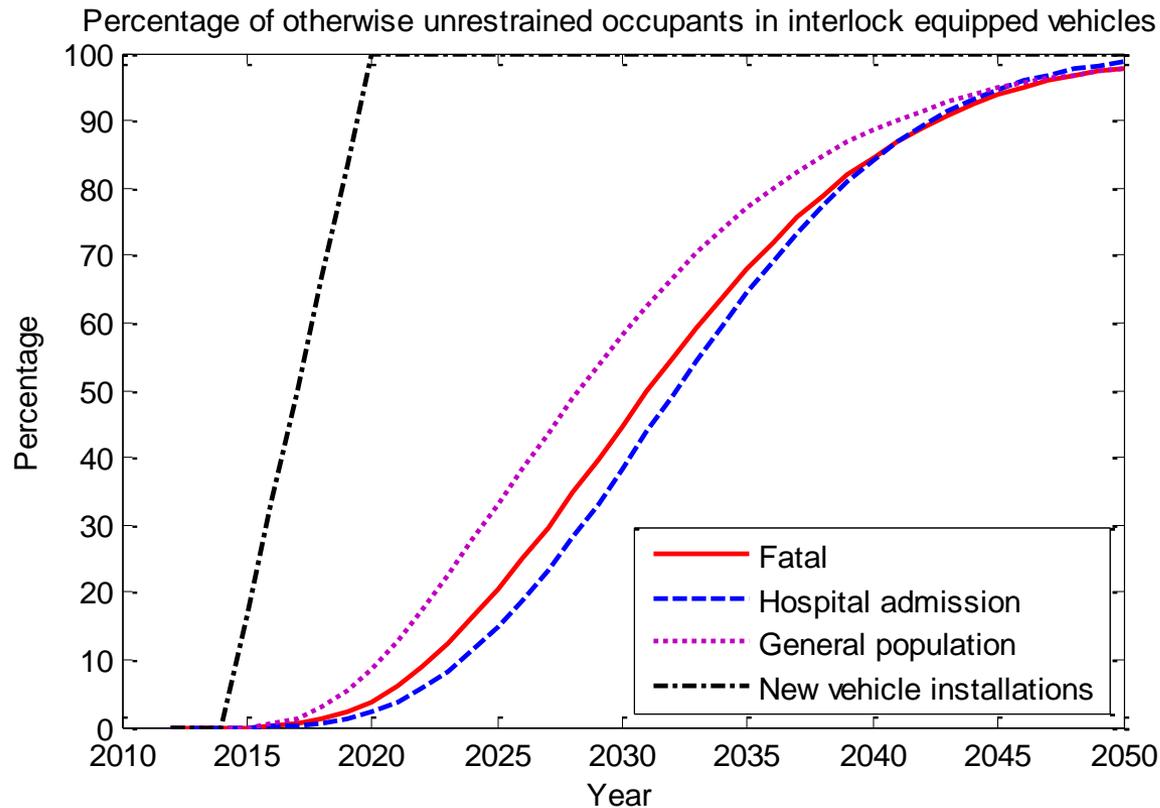
# Results: vehicle age by restraint use

	Mean vehicle age		
Injury severity	All drivers	Restrained drivers	Unrestrained drivers
None	9.99	9.94	12.62
Hospital admitted (but not fatal)	12.66	12.05	16.32
Fatal	13.09	11.93	15.50

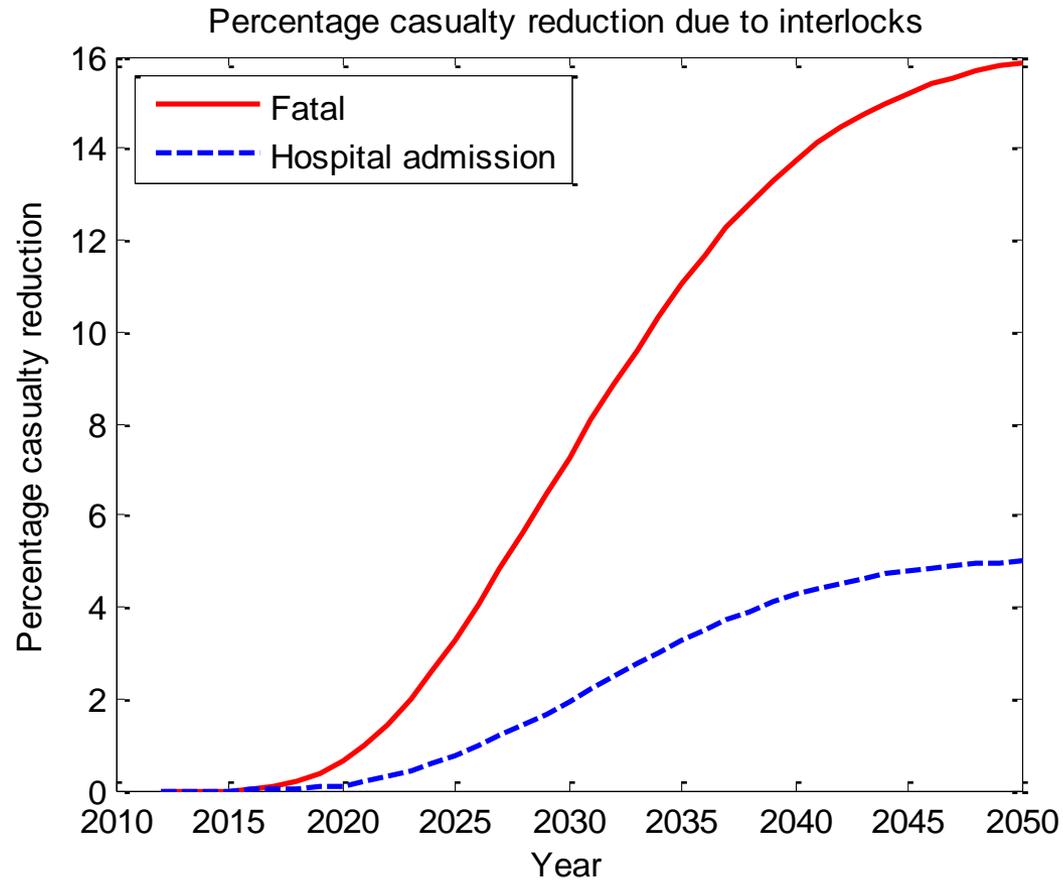
# Results: restraint non-usage by vehicle age



# Results: how many otherwise unrestrained drivers will be in interlock equipped vehicles?



# Results: casualty reductions due to interlocks



# Key results

- Maximum benefit achieved by 2050
  - 16% reduction in fatalities
  - 5% reduction in casualties requiring hospital admission
- The situation may be very different by then!
- Shorter term – by 2030:
  - 7% reduction in fatalities
  - 2% reduction in casualties requiring hospital admission

# Notes on results

- Casualty reductions are on top of those already achieved through other means
- Vehicle age profile was assumed constant
- Constant restraint use was assumed in the absence of interlocks
  - Seat belt reminders may accelerate casualty savings
  - Increased education, awareness, social norms

# Recommendations

- There are strong potential benefits to seat belt interlocks, but benefits may take years to be seen (like with any new vehicle technology)
- Even if benefits are not as great as predicted, the installation of interlocks should be encouraged
  - Low cost
  - After market installation?
  - Target high risk users

# Acknowledgements

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