Association between high ambient temperatures and road crashes in the warm season in Adelaide, South Australia: A time-series study, 2012–2021

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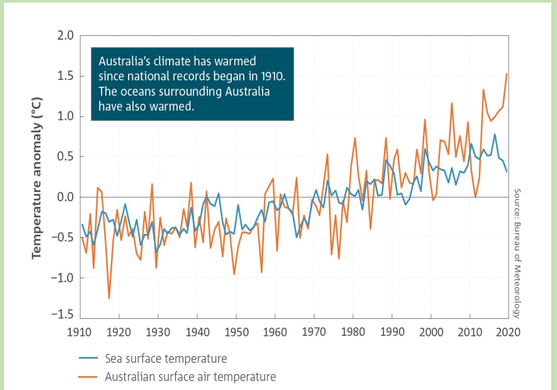
Background

The changing climate impacts population health, and health loss from road accidents is an increasing concern of global importance in the context of climate change.

The aim of this study aim is to examine the effects of high temperatures on road crashes and quantify the burden of road crashes attributable to high temperatures.



Temperatures are rising in Australia

Heat-related road crashes

Methods

- Data sources and collection:
  Daily *road crashes*
  (Department of Transport and Infrastructure 2021)
  Daily meteorological data
  (Scientific Information for Land Owners 2021)
- Study design: Time series
- Modelling approach
  -Distributed lag non-linear model (DLNM) with quasi-Poisson distribution for 5 lag days
  -confounders controlled for
  - ✓ Other weather variables (relative humidity, solar radiation, rainfall)
  - ✓ Seasonal and long-term trends
  - ✓ Day of week
  - ✓ Population as offset
  - ✓ Public holidays and school holidays
  - ✓ The day before the holiday begins and the day after it ends

Results

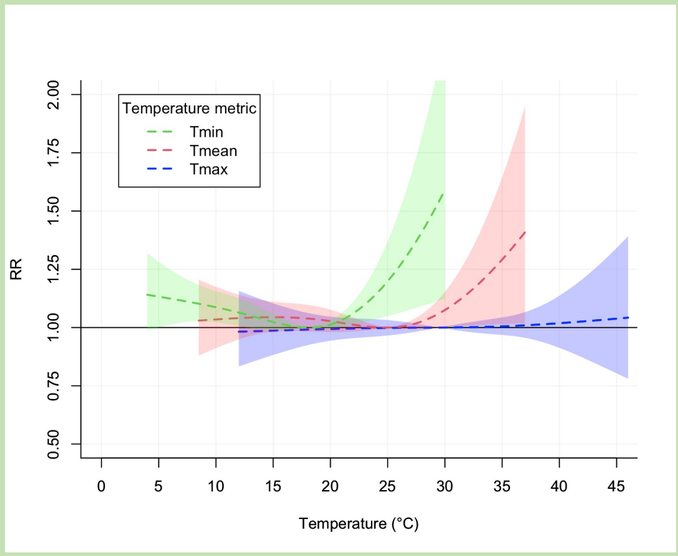


Fig 1. Cumulative exposure-response relationship between road crashes and ambient temperatures.

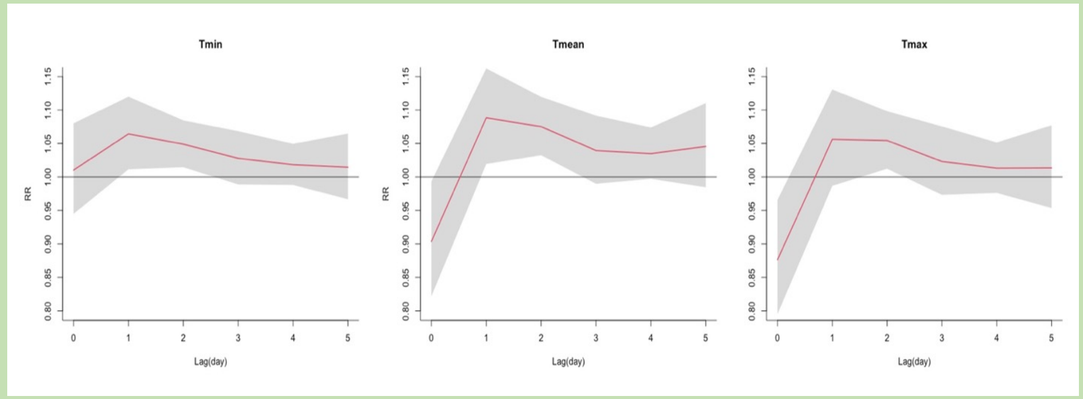


Fig 2. Relationship between road crashes and different temperature metrics for 5 lag days.

Key findings

- A non-linear association between high temperatures and road crashes (Figure 1).
- Pronounced effects were observed with minimum temperatures (Figure 2).
- Relative Risk with 1 ℃ increase in Tmin is 1.025 (95%CI: 1.006-1.044) (Table 1).
- High ambient temperatures accounted for between 0.17-0.79% of the road crash burden.
- Moderate hot temperatures were responsible for more road crashes than extreme hot temperatures.

	Tmin		Tmean		Tmax	
	AN	AF (%)	AN	AF(%)	AN	AF(%)
Heat	513 (152-877)	0.79 (0.15-1.33)	429 (17-828)	0.66 (0.04-1.28)	110 (-524-699)	0.17 (-0.75-1.11)
Moderate hot	356 (77-612)	0.55 (0.12-1.01)	308 (4-601)	0.48 (-0.02-0.93)	7 (-77-88)	0.01 (-0.11-0.15)
Extreme hot	207 (58-351)	0.32 (0.08-0.53)	143 (-2.4-628)	0.22 (0.03-0.40)	103 (77-87)	0.16 (-0.66-0.94)

Table 3 Attributable Risk of ambient hot temperature on road crashes.

Conclusions and implications

- Road crashes attributed to heat are estimated to gradually increase in the future. The findings highlight the significant impact of temperatures on road crashes and also may suggest that it is imperative to develop preventive measures and raise awareness of road safety for drivers to reduce the burden of road crashes in the context of climate change.

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