Estimating the effects of a reduced speed enforcement threshold: Strengths, limitations and where to from here

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Background

- NZ Police typically operate with a 10km/h speed enforcement threshold which is publicised.
- Other jurisdictions already commenced operating with reduced or zero thresholds (e.g. Australia (VIC, QLD, WA), Scotland, France, Netherlands, Sweden, Switzerland)
- Recommended practice is to operate with minimal ‘tolerance’ (OECD, 2006; GRSP, 2008)
- Wealth of research that indicates that low-level speeding presents the majority of speed-attributable collective risk
- Previous research: Scandinavian studies (Andersson, 1989; Luoma et al., 2012) various Victorian studies (most recently Cameron, 2008):
  - Fewer speeding vehicles (50% reduction in speed limit exceedance)
  - Lower mean speeds (2.5 km/h)
  - Increased homogeneity – important independent safety effect
  - However no research on crash effects
3 consecutive 2-month summer campaigns

- Best data is for the 2-month campaigns
  - Ran 1 December – 31 January for 3 consecutive years
  - Lower 4km/h threshold (officers, as always able to issue at any speed above the limit).

The summer of no speed tolerance
Estimating 2013/14 effects on speeding and crashes

- Quasi experimental study design
  - No ‘true’ controls
- Data sources
  - Speed survey data
  - Bliptrack (NZTA) and speed camera
  - Crash data (TCR)

Analysing speeding
- Sample size over 5m speed readings
- Data ‘cleaned’ to ensure only free-flow vehicle speeds were included
- Generalised linear models
  - Logistic regressions
- 2 variables by speed exceeded
  - <11km/h over the limit
  - >10km/h over the limit

Analysing crashes
- Incident counts per day of each period
- Poisson & Negative binomial regressions
- 3 variables by injury severity
  - Minor injury
  - Serious injury
  - Fatal injury
Results: Speeding vehicles

Significant reductions in speeding by <11km/h
- 36% reduction compared to the lowest control / prev period
- Net 22% reduction when controlling for max variance within controls (conservative)

Significant reductions in speeding by >10km/h
- 45% reduction compared to the lowest control / prev period
- Net 25% reduction when controlling for max variance within controls (conservative)
Comparing speed camera-sourced speed survey data confirms the reductions were likely present across the network.

Not just increased ‘kangaroo’ jumps at the camera sites.
Crash analysis

- 16% decrease in minor injury crashes
- 8% decrease in serious injury crashes
- 22% decrease in fatal crashes
- However:
  - The small numbers problem has meant these estimates are not statistically robust (n.s. with overlapping 95% CIs).
  - Not as big of an issue and to be expected more and more as crash numbers diminish (Oliver, Wang, & Grzebieta, 2014)
  - Second campaign produced similar effects for fatal and injury crashes (but lower % decrease)
Campaigns 1 and 2 (2013/14 - 2014/15)

- Alternative way of looking at the crash effects
  - Log regression has good fit with crashes over controls ($R^2 = .97$)
  - Intervention periods predicted to have decreases, but less large than observed

- Best estimates suggest:
  - 9 fatal crashes were prevented in the Dec/Jan 2013/14 period
  - 4 fatal crashes were prevented in the Dec/Jan 2014/15 period
Fatal crash increase for 2015/16 campaign: What happened in year 3?

- Initially it was intended to apply an *interrupted time series* analysis using multiple breaks
  - More likely to produce crash reduction estimates with small numbers (Oliver et al., 2014).
  - Produces better ‘overall’ effect for intervention
  - Easier to make use of multiple controls (found to be a problem with traditional Poisson-type logit)

- 2015/16 break from previous years
  - Worst summer since 2009/10
  - Noticed a big increase in restraint fatalities (~9 of the fatal increase)
  - Officer buy-in diminishing (big drop in <11k notices)
  - Petrol price at historic low (petrol price index ↓ 20¢)
  - Role of novelty effect
Public opinions on enforcement thresholds

- 3 surveys (3,000 - 10,000 respondents)
  - 57% supported vs 37% opposed
  - 66% supported vs 29% opposed
  - 43% supported vs 30% opposed

- Support for a permanent reduction
  - Attitudes study shows preference for 4.5 km/h threshold for rural and 3.2 km/h urban (Austroads 2013)
  - NZ Police research also shows 71% believe speeds below 10 km/h excess should be ticketed in rural; 79% for urban
  - Police research also indicated 62% believe the reduced threshold improved their own driving.
Discussion

- Purpose was to decrease speeding at the network level
- Made significant gains in speed compliance
  - Evidence that fatal and injury crashes have been prevented (although no exact estimates)
  - Diminishing returns noticed during campaign 2 and disappeared during campaign 3.
- Reduced risk and prevented crashes during first two campaigns
- Time for something new?
Conclusions

- Reducing or removing the tolerance reduces the *de facto* speed limit
- Reduces speeding behaviour within and above the normal threshold
- A longer intervention period to estimate crash risk
- Retaining public support of Police enforcement is important
- 26 fewer people died during the high risk holiday period which has created New Zealand’s safest summer since 1950
Where to from here?

- Sufficiency of evidence that it reduces speeding and related risk
- Lowers the de-facto speed limit on roads
- Use for campaign-type scenarios has perhaps been exhausted
- Holiday period risk overstated, though summer still higher risk
- Good case for permanent reduction
  - 10 km/h threshold is not good practice, and is a relic from the past
  - Police processing capacity currently the main obstacle
  - Need to better inform and educate frontline staff
  - Need to continue engaging with the public about speed
  - Permanent reduction would also provide much more data!
  - Police examining different ways of delivering enforcement going into the future – watch this space
Questions / Comments

Detailed results published here:


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