Effectiveness of 40 km/h Speed Limits in Reducing Crashes on Melbourne Roads with Strip Shopping and Factors Influencing Effectiveness

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Abstract

The effectiveness of reducing the speed limit to 40 km/h on Melbourne arterial roads with strip shopping was evaluated in a quasi-experiment. The treatment was associated with a 14% reduction in casualty crashes, 17% reduction in fatal and serious injury crashes, translating to a benefit-cost ratio of 13. Characteristics associated with a larger reduction in casualty crashes were two-lane roads, sheltered parking on both sides, fewer off-street parking facilities, presence of a railway station but without parks or sports fields. FSI crash reductions were larger on roads with fewer off-street parking facilities without a painted chevron median.

Background

Since 2005, speed limits were reduced to 40km/h on 49 Melbourne roads with strip shopping to reduce crashes. Both static and LED signs were used, and the reduced speed limit operated part-time at most sites. Past evaluations found a non-significant reduction in crashes at the initial 18 sites (Scully, Newstead & Corben, 2008) and for the next 24 roads treated under the Safer Road Infrastructure Program, a 19.5% reduction ($p<0.05$) in casualty crashes when 40km/h was permanently in operation but no significant effect when the 40 km/h was part-time (Budd & Newstead, 2016). By mid-2014, more roads were treated under the Safe Systems Road Infrastructure Program.

We aimed to measure:

1. the crash reduction effectiveness, and benefit-cost ratio (BCR), of reducing the speed limit across all 49 segments;
2. whether characteristics of roads where treatment was effective differed from those where it was not.

Method

We conducted a quasi-experimental study to estimate the crash rate change after reducing the speed limit controlling for the crash rate change that occurred in the relevant local government area over the same time, using Generalized Estimating Equations (GEEs). This controls for potential confounders such as changes in population size and distribution, traffic, cyclist and pedestrian volumes, police-reporting, road safety campaigns and other local variations.

Sites were categorized according to whether or not there was a reduction in crashes, and the size of the reduction. We used logistic regression and GEEs to determine whether roads where the treatment worked differed from roads where it did not, in terms of the design of the road, the roadside environment, and facilities and amenities nearby. The characteristics were chosen from those shown to be associated with crash risk on strip shopping roads in metropolitan Melbourne (Stephan, 2015).

BCR estimates were based on project and annual maintenance costs and a 15 year project life.

Results

Overall casualty and fatal and serious injury crash rates reduced significantly, particularly for vehicle-only crashes (the most common crash type).

Table 1. Change in crash rates after speed limit reduction

	Change in casualty crash rate	95% Confidence Interval	Change in fatal and serious injury crash rate	95% Confidence Interval
Overall	**-14%**	**-21% to -5%**	**-17%**	**-26% to -7%**
Vehicle-only	**-20%**	**-30% to -10%**	**-25%**	**-36% to -1%**
Pedestrian-involved	-14%	-31% to +6%	-15%	-31% to +5%
Cyclist-involved	-6%	-18% to +7%	+5%	-18% to +34%

* $p<0.05$ in bold type

Estimated present-value crash savings were approximately $159 million, with a cost of $12 million (discount rate 7%). The BCR was 13.0.

There was no difference in effectiveness between permanent or part-time operation of the 40 km/h speed limit but the characteristics of the road and environment did have an influence.

Characteristics associated with a larger reduction in casualty crashes were two-lane roads, sheltered parking on both sides, fewer off-street parking facilities, where there was a railway station nearby but no parks or sports fields adjacent. The FSI crash reduction was larger on roads with fewer off-street parking facilities without a painted chevron median.

Conclusions

Reducing the speed limit to 40 km/h on arterial roads with strip shopping is a cost-effective method to reduce crashes. Future treatments should target roads with features where the treatment was shown to be more effective.

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References

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