The lowering of speed limits in the Adelaide Hills – Public Opinion and On-road Observations

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Biography
Jeremy Woolley has been working in the field of road safety since 1997. He has spent most of this time as Research Fellow with the Transport Systems Centre at the University of South Australia and more recently as a Senior Research Fellow at the former Road Accident Research Unit at the University of Adelaide. Jeremy's interests include: red-light running, younger and older drivers, and campaign evaluations. In particular, Jeremy has focussed much of his work on issues surrounding speeding and lower speed limits.

Abstract
In December 2001 speed limits on a selected group of roads in the Adelaide Hills and Mt Barker Council Areas were reduced from 100 km/h to 80 km/h based on assessments of appropriate speed limits for the roads concerned. The changes were made to roads under Local Government as well as State jurisdiction, in an area which covers a large proportion of the Adelaide Hills. A publicity campaign was conducted by the State Government to inform people of the pending change in speed limit. Telephone questionnaire surveys were conducted two months prior to the introduction of the scheme and at the same time in the following year. Thirteen speed monitoring sites (of which five had limits maintained at 100 km/h) provided data on speeds before and after the introduction of the 80 km/h limit as an indicative measure only. It was found that the scheme had been well accepted by Hills residents with no major issues arising. Speed monitoring suggested that speeds on the 80 km/h sections had dropped compared with control sites, and absolutely, by several kilometres per hour.

1 INTRODUCTION

A scheme was initiated early in 2001 to implement 80 km/h speed zoning on appropriate sections of Adelaide Hills roads (Hills 80k). It was based on traffic engineers' assessments on the characteristics of all roads according to the Australian Standards. The scheme, referred to as Hills 80k, lay within the Adelaide Hills Council and Mount Barker District Council areas. Not all roads in this area had their speed limits reduced to 80 km/h as a higher speed limit was deemed appropriate in many cases. Likewise, the South Eastern Freeway also maintained its 100/110 km/h speed limit.

Transport SA commissioned public opinion telephone surveys before and after the scheme was implemented. The brief was to report on the effects of the scheme on changes in stated attitudes. The study also measured changes in drivers' speed choices at locations where speeds would be expected to be relatively high (ie at mid-block locations). Traffic speed and volume data was collected at 13 sites (including control sites) for two week periods a year apart, before and after implementation of the scheme (see Dyson and Woolley 2003).

This paper describes a study to quantify behavioural change via on road speed observations due to a lowering of speed limit on predominantly winding roads in the Adelaide Hills. Changes in stated attitudes towards the speed limit were also measured using a telephone survey. The objectives of the study were to see if there

were any negative effects from the introduction of the lowered limit and refine the process of implementing lower speed limits so that the same may be applied to other areas.

2 METHODOLOGY

2.1 Telephone Interviews

A telephone questionnaire was designed to gauge the level of support for the scheme, and to anticipate problems arising from it, before it was implemented (pre-). After the scheme had been in place for several months a similar questionnaire was used to test for changes in the level of support and to capture information likely to be useful in improving the scheme and any possible future extension (post-).

The pre- sample of 404 respondents and post- sample of 406 residents were drawn at random from residents with qualifying postcodes. These postcodes covered the whole of the Adelaide Hills and Mount Barker Council areas. All respondents needed to have lived within the dual-council catchment for over three months. Because of the time constraints it was not practicable to stratify the pre- sample by age group in order to obtain a higher degree of representation. The post- sample followed suit. Response rates (proportion of calls generating a respondent) were 39 per cent (pre-) and 36 per cent (post-).

Interviewing took place early on weekday evenings, Tuesday and Wednesday 13/14th November 2001, and Tuesday and Wednesday 12/13th November 2002, in each case after the introduction of Daylight Saving for the summer. All respondents were over 16 and they did not need to be drivers; only 12 per cent (pre-) and 16 per cent (post-) had lived in the Hills for less than five years.

2.2 Speed Surveys

In assessing whether reducing speed limits on certain Hills roads would have a material effect on driver behaviour, it was seen as necessary to conduct traffic surveys before and after the implementation of Hills 80k. Five control sites were established on 100 km/h limit roads in order to account for temporal/environmental influences which might affect the before versus after comparison on roads with changed limits in the same general area over the same periods. Though they are, by their very nature, different from roads whose limits were reduced, on account of their general character, temporal/environmental effects on mass speed parameters might be expected to be similar, to a first approximation.

Eight experimental measurement sites in the Adelaide Hills and Mount Barker Council areas were selected for traffic monitoring in 2001, prior to any reductions in speed limits as part of Hills 80k. Sites generally consisted of lengths of straight road with minimal gradient. This ensured that relatively free flow speeds were measured without significant influence from road geometry (curves and gradients). This also meant that sites were located where faster travelling speeds were expected. All sites (experimental and control) were on roads with 100 km/h limits in 2001.

3 OUTCOMES

3.1 Telephone Interviews

3.1.1 Pre-implementation survey

The main findings from the pre-implementation survey are shown below:

- Less than half the pre-implementation respondents (31 per cent) stated that they were dissatisfied with extant speed limits. Median ages of respondents were 49 (pre-) and 47 (post-). These ages appear likely to be higher than in the general population of road users.
- Older respondents expressed a higher level of dissatisfaction. In view of the inferred bias of the sample towards older persons, it seems possible that less than 30 per cent of Hills residents over the age of 16 would have expressed dissatisfaction.

- The most commonly expressed reason for dissatisfaction was that speed limits were too high on some roads. This discrimination was strongly reinforced in responses to further questions.
- Improved safety was outstandingly the quoted reason for anticipated improvement in road use and for being the justification for the scheme.
- Reasons for being anxious about being caught for speeding under the scheme revealed little except for uncertainty about enforcement strategies.

3.1.2 Post-implementation survey

The main findings from the post-implementation survey are shown below:

- Older respondents were more critical of the pre-implementation status quo than younger respondents; the reverse was true post-implementation; the proportion of dissatisfied respondents overall fell from 31 per cent to 17 per cent , though deduced bias in the age distribution in the sample exaggerates this difference.
- The outcome that the post-implementation sample has been more in favour than the pre-implementation sample cements the finding that the Hills 80k scheme has been a positive initiative.
- However, only 45 per cent thought that the Hills 80k scheme had reduced speeds, down from the anticipation of 57 per cent pre-implementation. This 'disappointment' appears to have been particularly marked in more vulnerable road users.
- Criticism of the publicity process prior to implementation was invited post-implementation. Criticism was relatively muted, with only 5 per cent asking for a feedback opportunity to be in place, and 20 per cent wanting more efficient advertising.

3.2 Traffic Monitoring

Although traffic was monitored for more than one week, the period covered by the data analysed was generally reduced to seven consecutive days, by judicious examination to find the most consistent data. There is clearly some sacrifice of exact temporal balance but weather events would not necessarily be consistent across sites at particular times anyway. The weather at the time of monitoring in 2001 was generally wetter than in 2002 (Bureau of Meteorology records). To sharpen the comparison, only weekday traffic was included in the principal analysis. Speeds of all vehicles were included and no headway cut-off was used.

3.2.1 Traffic monitoring on weekdays

Figure 1 shows the change in weekly mass speed parameter estimates (mean and 85^{th} percentile) between very early spring 2001 and very late winter 2002, and thus possibly attributable to the change in speed limit. In either figure, the sites with reduced limit are on the left and those with unchanged limit on the right. The fact that the sampling periods are slightly less than 52 weeks apart is thought to be unimportant. The similarity in the outcomes is confirmed by related parameters (e.g. 75^{th} and 95^{th} percentiles, not shown). Data are presented separately for speeds in either direction at each of the 13 sites (eight experimental and five control).

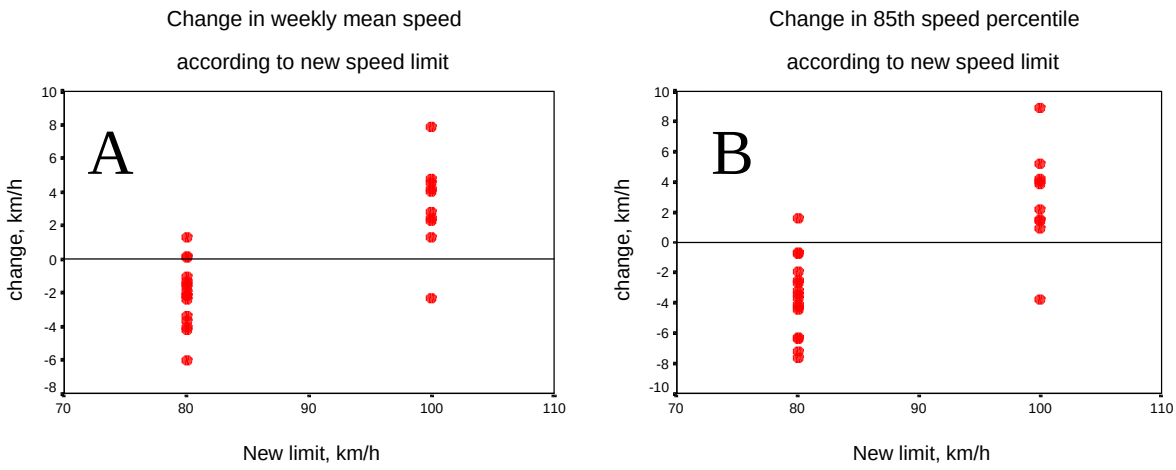

Figure 1 - Change in weekly A) mean speed and B) 85th percentile speed according to the new speed limit

The steepness of the line of best fit joining the two sets of points on either graph is, at first sight, encouraging in relation to the reduced limit. However, much of the steepness is attributable to rising speeds at the sites where the limit has not changed. The degree to which this may be attributable to drier conditions is not known, though it is expected to have affected all sites somewhat similarly.

One site, with unchanged 100 km/h limit, gives cause for concern. This site has shown an increase in mean speed of 4.8 km/h in one direction and 7.9 in the other. A closer look shows that even the 85th speed percentile in 2001 over a week was only 92 km/h. Even the 95th percentile was less than the posted limit, a most unusual outcome at a site of this type. The site is on a straight level road with good visibility, though it is relatively busy (Average Daily Traffic about 6700 vehicles). Clearly it was judged to be suitable to keep its higher speed limit. The authors conclude that there was some temporary, and possibly variable, factor inhibiting speeds at this site during the whole of the 2001 monitoring, the daily mean speed ranging between 76 and 82 km/h. In 2002 the range among days was a tight 87 to 88 km/h over a fortnight. The changes in mass speed parameters at this site have therefore been omitted from the assessment of speed change associated with the introduction of the 80 km/h limit elsewhere. This decision removes the two highest points in Figure 1A and B.

It is estimated that the crude mean weekday speed (mean of per site means) at the eight sites fell by 2.1 km/h and, correspondingly, the 85th percentile by 3.6 km/h and the 95th percentile by 4.1 km/h. If, further, we were to weight each site according to its traffic volume, we get little change in the reduction of the (weighted) mean weekly speed at the reduced limit sites (2.5 km/h), but larger reductions in the 85th percentile, to 4.3 km/h and in the 95th percentile, to 4.8 km/h.

In summary:

- The scheme to reduce speeds at the locations where the speeds are expected to be amongst the fastest (i.e. the mid-block), for each winding Hills route, appears to have been successful.
- Mean speeds and higher speed percentiles have been reduced at such locations on a sample of roads with reduced limits.
- The speed situation on roads with ongoing 100 km/h limits which are located generally some distance away from the reduced limit zones is ambiguous; they appear to have risen slightly, but whether as a result of Hills 80k, more favourable weather at the time of post-implementation monitoring or some other factor is not known.
- Traffic volumes appear to have remained unchanged.
- The authors conclude that higher speeds have been reduced by an appreciable amount, conservatively of the order of 3 to 4 km/h, and mean speeds by of the order of 1 or 2 km/h, at locations where the speeds amongst the fastest for each route would be expected.

3.2.2 Traffic monitoring on weekends

The nature of traffic on Hills roads over the weekend might be expected to differ from weekday traffic most on Sundays. The reductions in mass speed parameters on Saturdays were similar to those on weekdays: mean, 2.2 km/h; 85th percentile, 3.2 km/h; 95th percentile 1.2 km/h; though the reduction in the 95th percentile was less (see Table 1). On Sundays the reductions were much lower, but they were reduced from a lower base. Thus, exceptionally, the 95th percentile on Sunday increased. One must bear in mind that these estimates are based on just two days data, one in 2001 and one in 2002. So the overall outcome – i.e. the size of the speed change - should be taken as only as indicative. However the differences *among* the parameters seem likely to be more robust. This suggests that at the weekend the 85th percentile has fallen more than both the mean speed and the 95th percentile. This does not bode well: the fastest drivers on Saturdays and, particularly, Sundays have been less influenced by the change in limit than the faster drivers.

Table 1 - Mass speed parameters weekdays compared with weekends before and after implementation of speed limit reduction: average of seven reduced limit locations

Period	Pre-limit: 100k			Post-limit: 80k		
	Mean speed	85th speed percentile	95th speed percentile	Mean speed	85th speed percentile	95th speed percentile
Weekdays	84.9	97.8	107.1	82.9	94.3	103.1
Saturday	84.4	97.3	106.2	82.2	94.1	105.0
Sunday	81.7	94.8	103.7	81.4	92.9	104.7

In summary:

- Speed change outcomes differ somewhat from the weekday outcomes, though on a less secure basis. There is an indication of 'weekend problem of (continuing) excessive speeds'.
- There is a speeding problem at faster localities on 80k roads which is exacerbated at the weekends. Due to generally lower speeds on Sundays, the problem is thus intensified.
- As speeds are more variable on Sundays, together with the presumption that the roads are used for somewhat different purposes, these may constitute a road safety problem.
- Changes in volumes at the weekend appear to vary among locations. Some of the impressions, stated by survey respondents, of higher speeds might, in fact, be higher volumes where they occur.

4 RECOMMENDATIONS

The authors recommend the following as a result of the study:

- It is recommended that a detailed investigation is carried out into crash locations in the Adelaide Hills, in particular contrasting 80k-type roads from 100k-type roads and weekdays versus weekends. Additional, widespread short-term speed and volume monitoring may be required.
- Traffic should be further monitored for at least a week at the sites used in this study.
- In the event that the changes recorded in this study are confirmed, and that overall Hills crash rates are subsequently found to have fallen, there may be a need for a policy decision on 100 km/h limit roads peripheral to the Hills 80k main zone.

5 REFERENCES

Dyson C and Woolley J (2003). *Introduction of the Adelaide Hills 80km/h Area Scheme for Predominantly Winding Hills Roads*. Report for Safety Strategy, Transport SA, Adelaide, February.

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KEYWORDS
Hills area, Lower Speed Limits, questionnaire survey, speed measurement, traffic data