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SPEED LIMIT MYTHS - BUSTED

Myth 5: "The 85th percentile method works best" – BUSTED

One of the oldest criteria for setting speed limits is the 85th percentile speed - the speed at or below which 85% of motorists travel under free flow conditions, when their speed choice is not constrained by vehicles in front of them. The idea that limits should be set at, or close to, the 85th percentile speed dates back to the early 1940s in the USA (TRB 1998). Three main arguments were put forward at the time:

1. *The collective wisdom argument*: that most drivers are capable of making good judgements about 'safe' driving speeds and will choose to drive at 'safe' speeds. Therefore, speed management need only limit the speeds of the small minority of drivers who are incompetent or irresponsible.

2. *The speed dispersion argument*: that speed limits near the 85th percentile will minimise the variance of the speed distribution, thereby minimising opportunities for vehicle conflict and crashes. An important element of this argument is the proposition that setting speed limits lower than the 85th percentile will lead to greater speed dispersion, conflict and crashes - offsetting any benefits of lower speeds.

3. *The enforcement practicality argument*: that 85th percentile limits represent a reasonable and realistic benchmark for enforcement. An argument based partly on the belief that enforcing speed limits below the 85th percentile requires a level of enforcement intensity and expense that has proven difficult to sustain. (TRB 1998).

The political appeal of 85th percentile speed limits is that they are, by design, acceptable to the great majority of drivers. If the limits are enforced with a fairly broad tolerance, and not very intensively, not many drivers will be penalised, or even inconvenienced. Behavioural impact will be minimal and authorities will be able to claim that compliance is generally good.

The traditional arguments for 85th percentile speed limits assert that they are both expedient and they produce the best safety outcomes. The first argument predicts that speed limits below the 85th percentile will not improve safety because drivers are already 'safe' and reducing their speeds will not make them safer. The second argument predicts that lower limits may increase crashes and casualties. The third predicts that attempts to reduce speeds by lowering limits will fail: because enforcement is too difficult. None of these arguments stack up.

1. *Collective wisdom – safe speed selection*.

Speeds selected by the majority of drivers are not safe in any absolute sense. Even at 50th or 70th percentile free speeds on most roads, the risk of a serious crash is small, but not zero. Lower speeds would reduce that risk. There are grounds to doubt the argument that most drivers will consistently select speeds that represent a good balance between the advantages and disadvantages of different speeds:

- Drivers may not consider all the *relevant* costs and benefits when they make their speed choices. Also, considerations are likely to be biased towards personal benefit (e.g. reduced actual or perceived travel times) as opposed to collective risk (e.g. loss of amenity, overall crash risks).
- Drivers' subjective assessments of risk, and the relationship between speed and risk, are likely to be inaccurate, for the following reasons:
    - Although serious and fatal crashes happen every day, they are rare in the experience of individual drivers.
    - The personal experience of most drivers convinces them that the speeds at which they usually drive are 'safe'.
    - Many people find the objective data on speed risks surprising and counter-intuitive.

For these reasons, limits based on drivers' unconstrained speed choices are unlikely to deliver an optimum balance between costs and benefits for the community as a whole, or even individual drivers.

2. *Speed dispersion – minimises vehicle conflicts.*

Research conducted in the 1960s (Solomon 1964; Cirillo 1968) [cited in TRB 1998]; RTI 1970 [cited in TRB 1998]) appeared to show that vehicles travelling at speeds that were close to average had the lowest crash risk, while both slower vehicles and faster vehicles were more at risk of crashing. This was interpreted as providing support for the speed dispersion argument, but there are a number of caveats to this interpretation:

- A number of methodological flaws in the studies may have inflated risk estimates for lower speed vehicles (see Kloeden, McLean, Moore and Ponte (1997), Kloeden, Ponte and McLean (2001), TRB 1998).
- The crashes studied were mainly low severity property damage crashes. Risk curves did not reflect the effects of speed on crash severity and injury/fatality risk. Evans (2004) noted that the types of crash that might be affected by speed dispersion (such as rear end and side-swipe crashes) form a very small proportion of high-severity crashes; the bulk of fatal crashes are

events where speed dispersion is an unlikely factor (e.g. single vehicle crashes, non-overtaking head-on crashes and intersection crashes on rural roads; side impacts, frontal crashes and pedestrian crashes on urban roads).

- More recent and better designed case-control studies based on casualty crashes (Kloeden et al. 1997, 2001, 2002) did not find an inverted-U risk function. Instead the results show a rapid monotonic increase in risk as speed increases.
- Many correlational studies have found a relationship between aggregate measures of speed dispersion and aggregate crash rates, but when the study design controls well for other variables the relationship can vanish (Taylor, Baruya and Kennedy, 2002).

3. *Enforcement practicality.*

When the 85th percentile criterion was first adopted, there was relatively little direct scientific evidence about the consequences of different travel speeds, or even the extent to which changing limits would affect travel speeds. There is now ample evidence that setting and enforcing lower speed limits is feasible, sustainable, and produces safety benefits.

In Australia this was recognised in the early 1980s and the use of the 85th percentile speed has been largely discontinued by many road authorities as a key factor in speed limit setting.

It is true that benefits from speed limit reductions may be very limited if enforcement and public education efforts are minimal. It is also true that actual speed reductions have typically been less than the nominal reduction in speed limit. However, substantial benefits have been observed even when enforcement was not very rigorous and initial speed compliance was poor, compared to contemporary Australian standards.

For example, the National Maximum Speed Limit of 55 mph (89 km/h) that was introduced in the United States in 1973 as a fuel-saving measure was well below previous 85th percentile speeds on most rural roads. It was below prevailing median speeds on rural interstate and rural primary roads, and well below typical design speeds of the rural interstate system. After the limit was imposed, a majority of drivers exceeded it. But mean speeds, 85th percentile speeds and speed variance were reduced on all three major rural road classes (interstate highways, rural primaries and rural secondaries). There was a substantial reduction in the number of deaths, and the death rate per distance travelled (TRB 1998, Evans 2004, NHTSA 1998).