Understanding The Role of Speeding and Speed In Serious Crash Trauma & Driver Education opportunities

The New Zealand Institute of Driver Educators Inc.
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Prepared

Outline of this Talk

My thanks to NZIDE for inviting us to offer this presentation. I hope it is helpful.

Broad topics:

Brief background

1. Vision Zero-Safe System and Speed
2. The role of speed in crash occurrence and severity
3. The misunderstanding of the value of higher speeds
4. Alternatives to managing speed

For each broad topic- we will:

- Provide core evidence
- Consider New Zealand in particular (though speed effects are world wide- the laws of physics)
- Consider relevance for driver education (great term in place of training)

Brief Background

Current Road Safety Circumstances…..

1. Road Safety includes a LARGE volume of scientific research
   - evidence on what works and what does not
2. A lot is known, unfortunately, by a very small number of people
3. So, we know what to do, but often we are not doing it

I also understand that for some of this, I will be preaching to the converted:

Please forgive this……

Broad Topic 1: Vision Zero-Safe System and Speed

Trading off death and injury for speed (& imaginary) economic gains

- Road safety is one of the last vestige failures of civilization
- IMAGINE if the **law courts** run by Government worked like roads:
  - Soames you were speeding- take xxx out and break her leg in six places then make her wait 1 hour for help; take that guy there (innocent bystander) and kill him –Slowly. Now we react to this by punishing Soames. This is exactly what our roads **allow to happen**- and **it is within our power to stop this**
  - What about we make it worse: Trade off expensive court time spent on murder cases- limit court time per case & only get an extra 15 life imprisonments of innocent people per year. The economy will be better.
- No one would accept this, but we have been fooled into accepting it from our road transport system (through Victim Blaming)

- Road crash deaths and injuries are THE ONLY ARENA run by government in which such a trade-off is considered sane to even contemplate

New Zealand's National Road Safety Strategy is based on Vision Zero & Safe System

New Zealand has a very good Vision Zero-Safe System strategy- much better than the weak approach to Vision Zero-Safe System in Australia

Vision Zero-Safe System recognizes that speeds, vehicles, and road infrastructure must interact in a way that ensures safety.

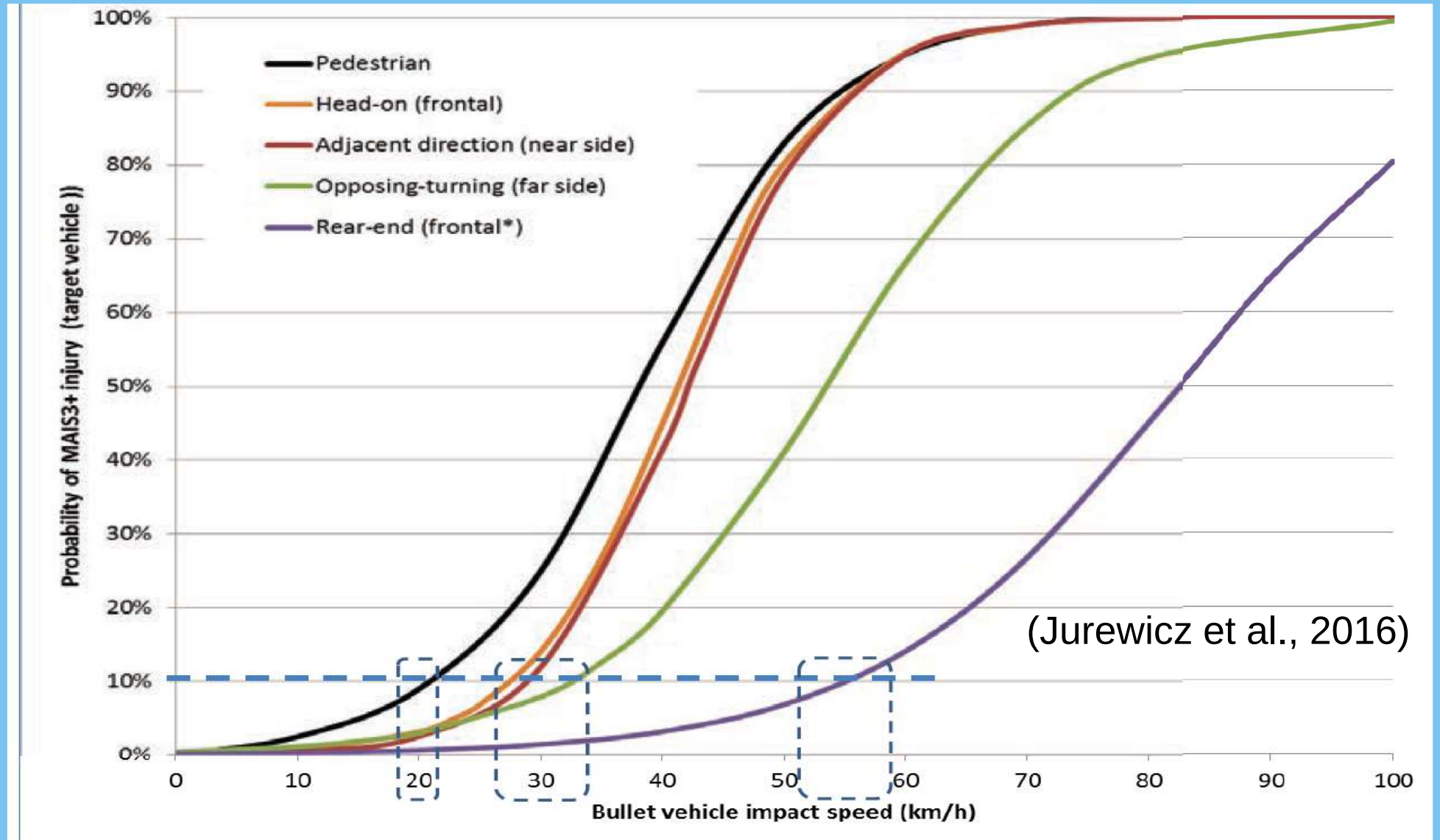
1. Accepts that human will always make mistakes & accommodates errors
2. Incorporates speeds, roads, and vehicles that limit crash forces to levels that are survivable for the human body
3. Motivates those who design and maintain the roads, manufacture vehicles, and administer safety programmes to accept and address shared responsibility for safety

We can't just deliver Vision Zero-Safe System overnight in the New Zealand (or indeed anywhere), yet it guides what we should do with road safety investments, and we can get there in the long term.

Speed is fundamental in this, as the most powerful factor in road safety

SPEED is critical, especially for pedestrians

Graph: Speed of impact and probability of major Injury



Relevance for Driver Education

- Aim to have drivers understand Safe System and call for/support Safe System delivery from Government in New Zealand

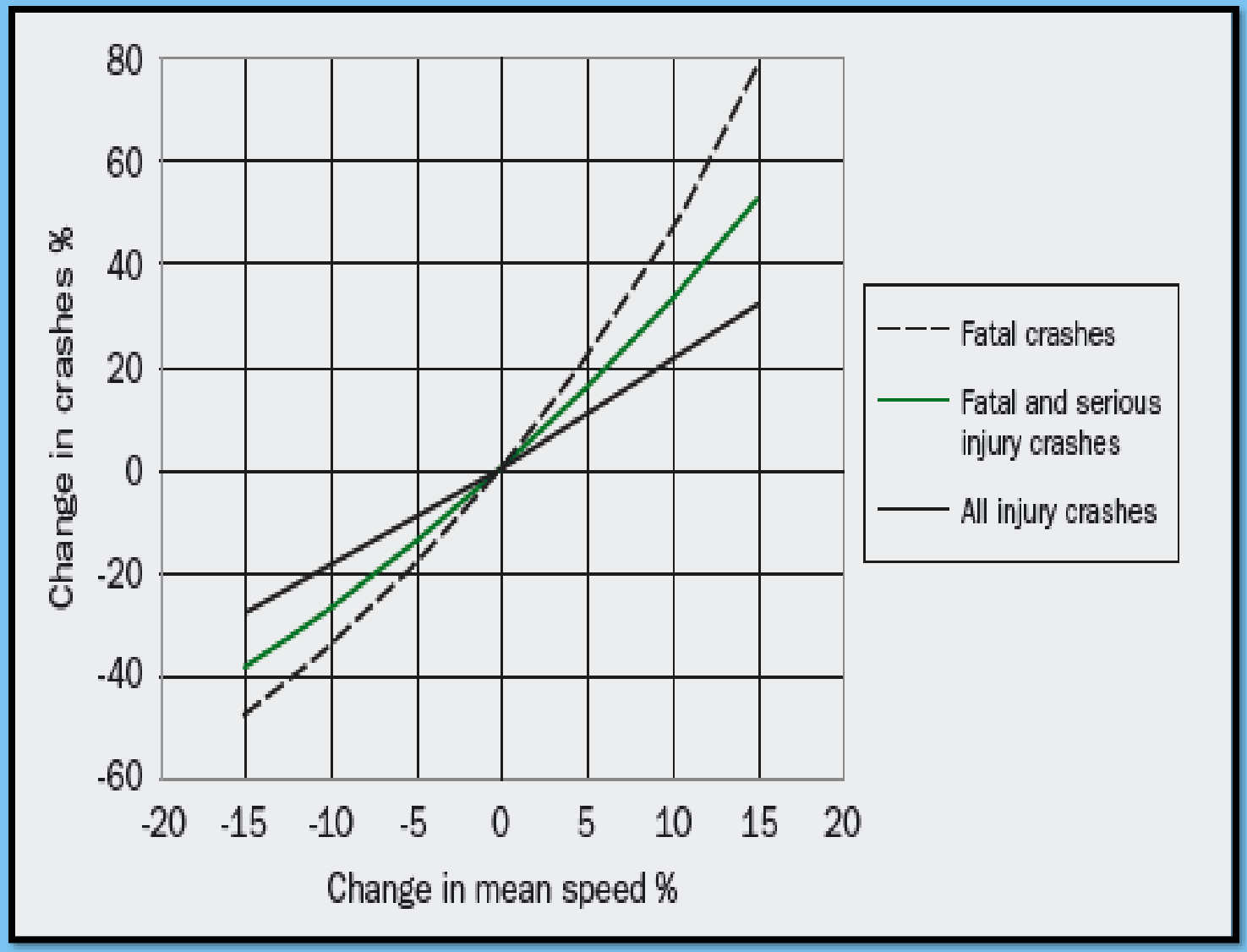
- Aim to reduce victim blaming as the fundamental response to news of serious crashes (more later on this)

Broad Topic 2: The role of speed in crash occurrence AND severity

The Power of managing speed

- **Small changes in speed have large impacts on road crash deaths and injuries:**
  - **Each 1% decrease in speed results in a ~ 4% decrease in deaths & a 3% decrease in serious injuries**

(Source: Nilsson, 2004 & many other studies since)



Commonsense Misjudgment of differences in speed

ERROR:

10kmh difference at the start = 10kmh difference at the of stopping

EVIDENCE

10kmh difference at the start (100kmh versus 110kmh)

Considering

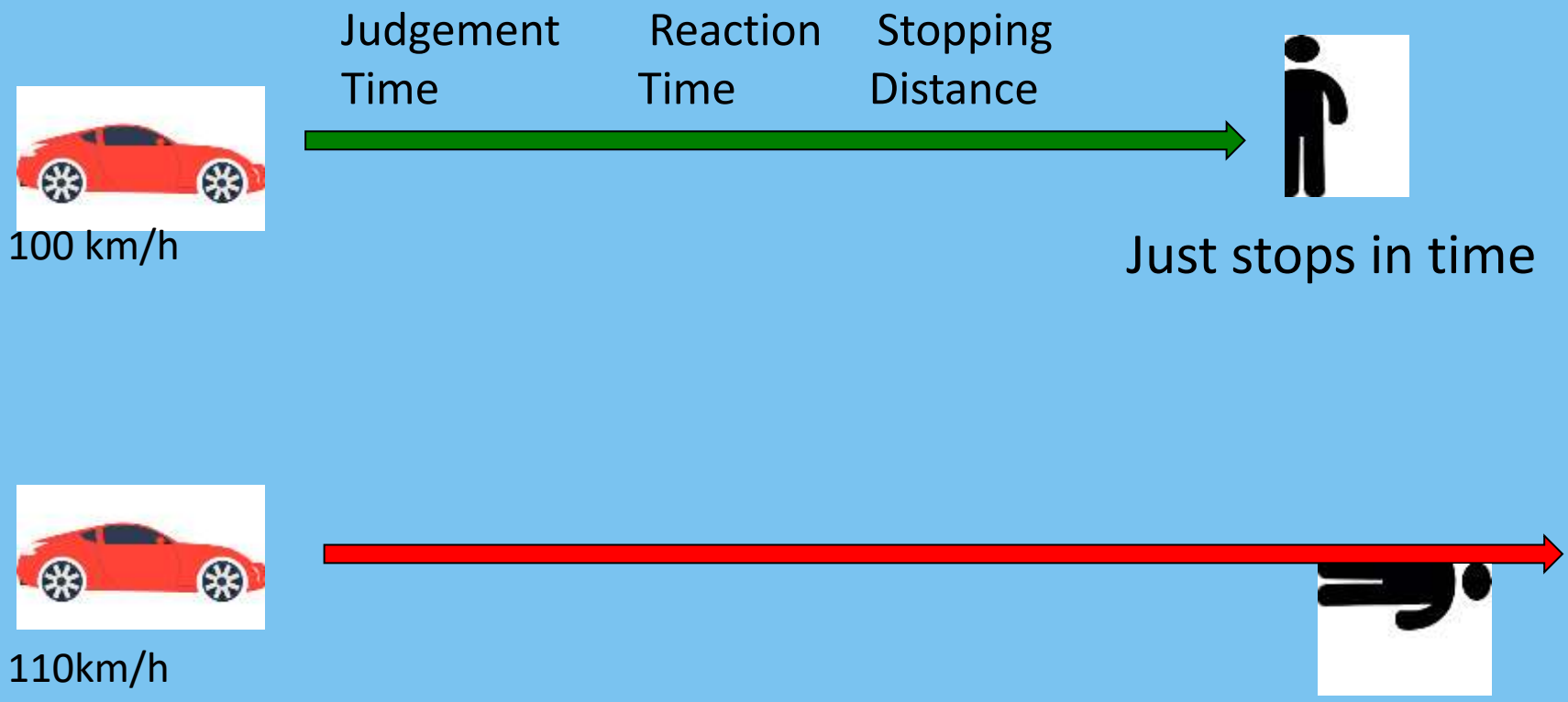
judgement time

reaction time

braking deceleration

= ? kmh difference at the end

Reality of Physics:
Small difference at start = LARGE difference at end



The effect of a small travelling speed change into an injury outcome

A small change in travel speed

↓

A relatively large change in stopping distance

↓

A much larger change in impact speed

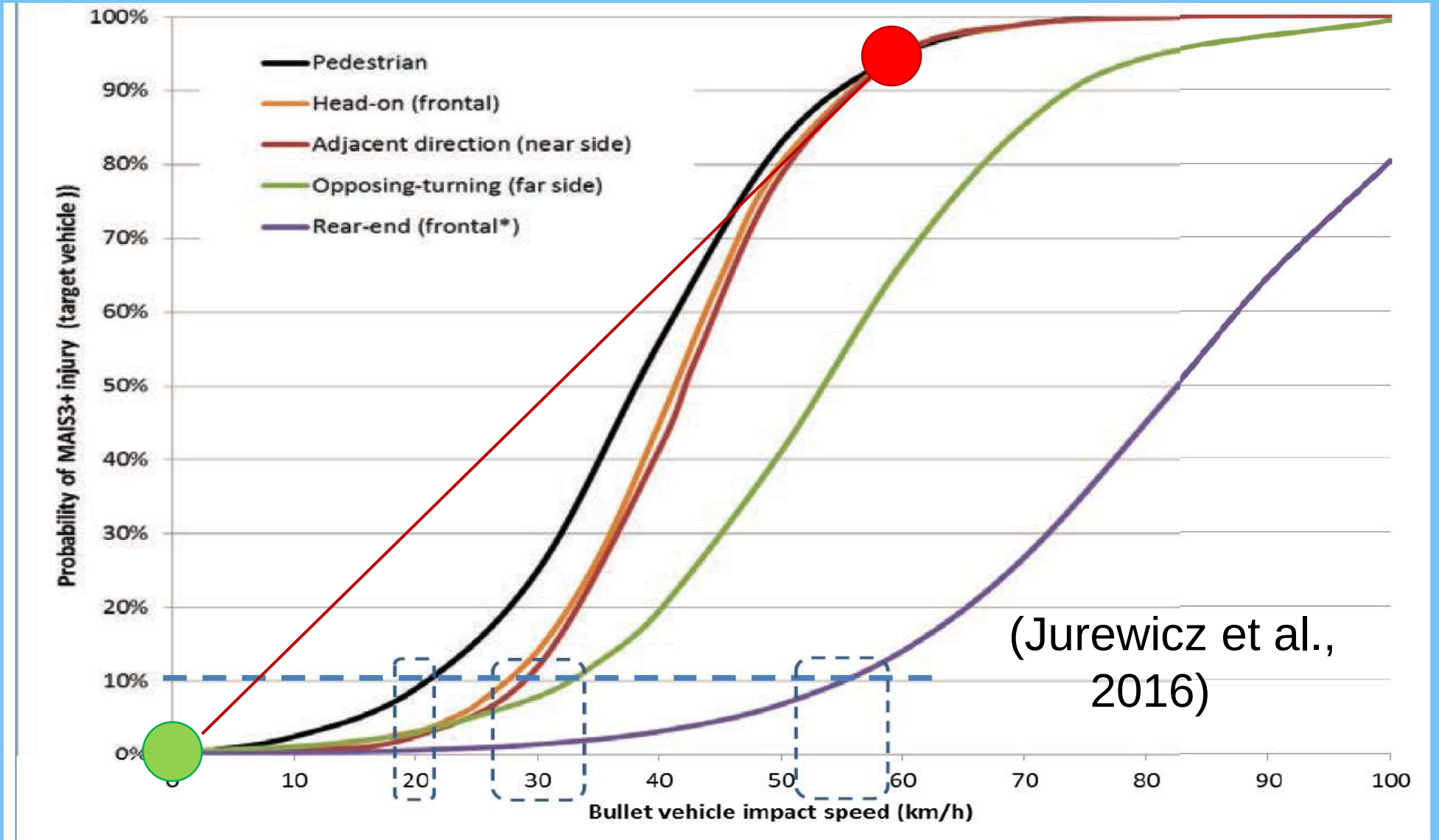
↓

A still larger change in impact energy

↓

A very large change in probability of death and serious injury

SPEED is critical for pedestrians:
Speed of impact and probability of Major Injury



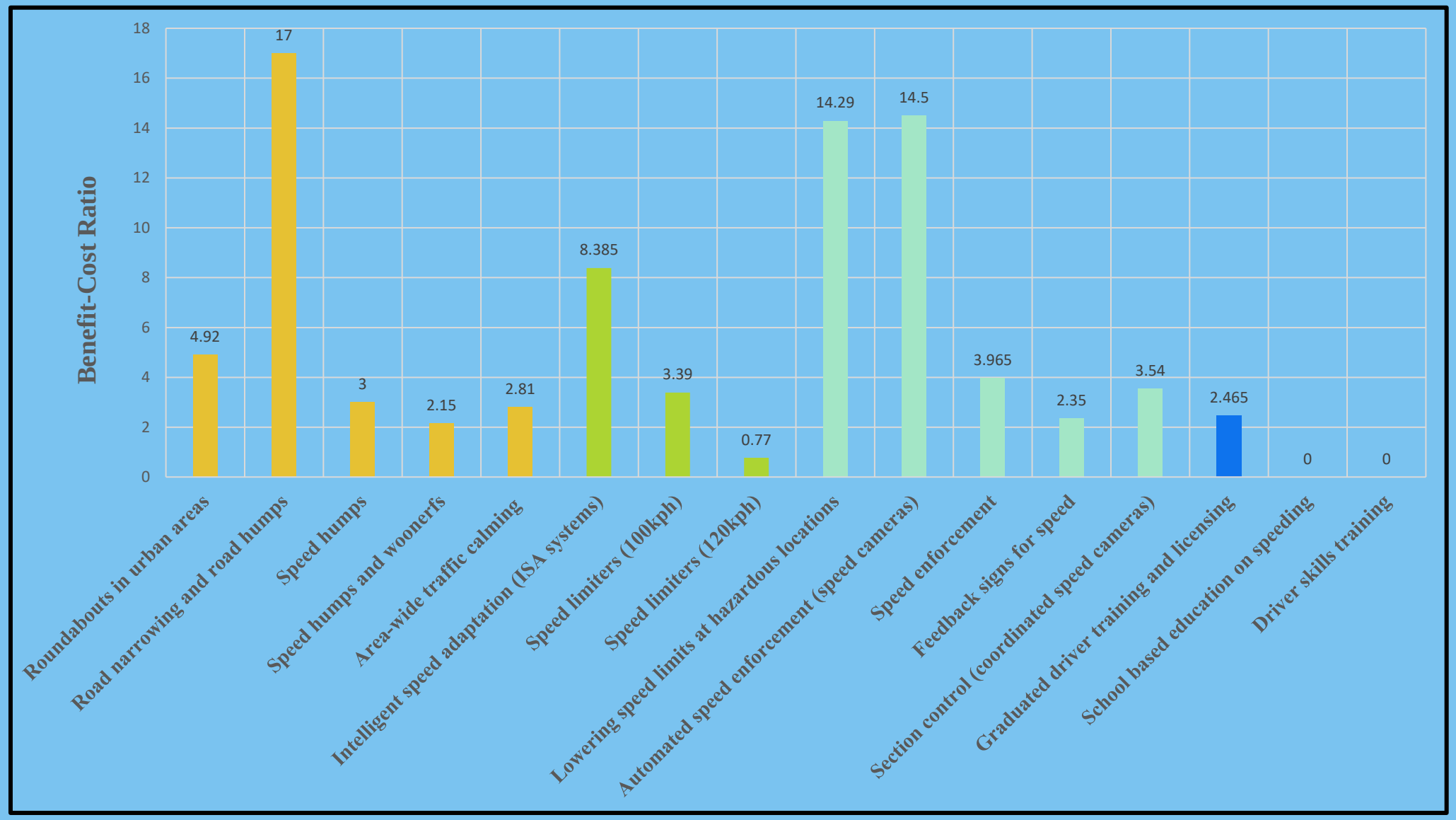
The REAL contribution of Speeding to fatal crashes in New Zealand

- New Zealand Police agree that the crash data greatly under-estimate speeding in serious crashes
  - Consider a crash to see why…..
- Correcting with an evidence-based estimate of omissions:

speeding is involved in around 60% of fatal crashes in New Zealand

Source: Job & Brodie (2022)

Benefit:Cost Ratios: the Huge Value of managing speed



Source: World Bank (Many original sources collated here)

Practical evidence: lower speed limits work

Changing speed limits:

NHTSA (1989): 89km/h up 105km/h 21% ↑ fatal crashes (USA)

Sliogeris (1992): 100km/h up 110km/h 25% ↑ injury crashes (Victoria)

Sliogeris (1992): 110km/h to 100km/h 19% ↓ injury crashes (Victoria)

Nilsson (1990): 110km/h to 90km/h 21% ↓ fatal crashes (Sweden3)

Scharping (1994): 60km/h to 50km/h 20% ↓ all crashes (Germany)

Bhatnagar (2010):110km/h to 100km/h 26% ↓ casualty crashes (New South Wales)

•Note this is not assuming that everyone obeys the limits. If they did benefits would be greater.

Effects of Speed Limit Reductions in New Zealand

100kmh to 90kmh

Data: 5 year - before to after serious crash reductions

Net = compared with control locations with no change in speed limit

Source: Evaluation by Fergus Tate

Effects of Speed Limit Reductions in New Zealand

Source: Evaluation by Fergus Tate

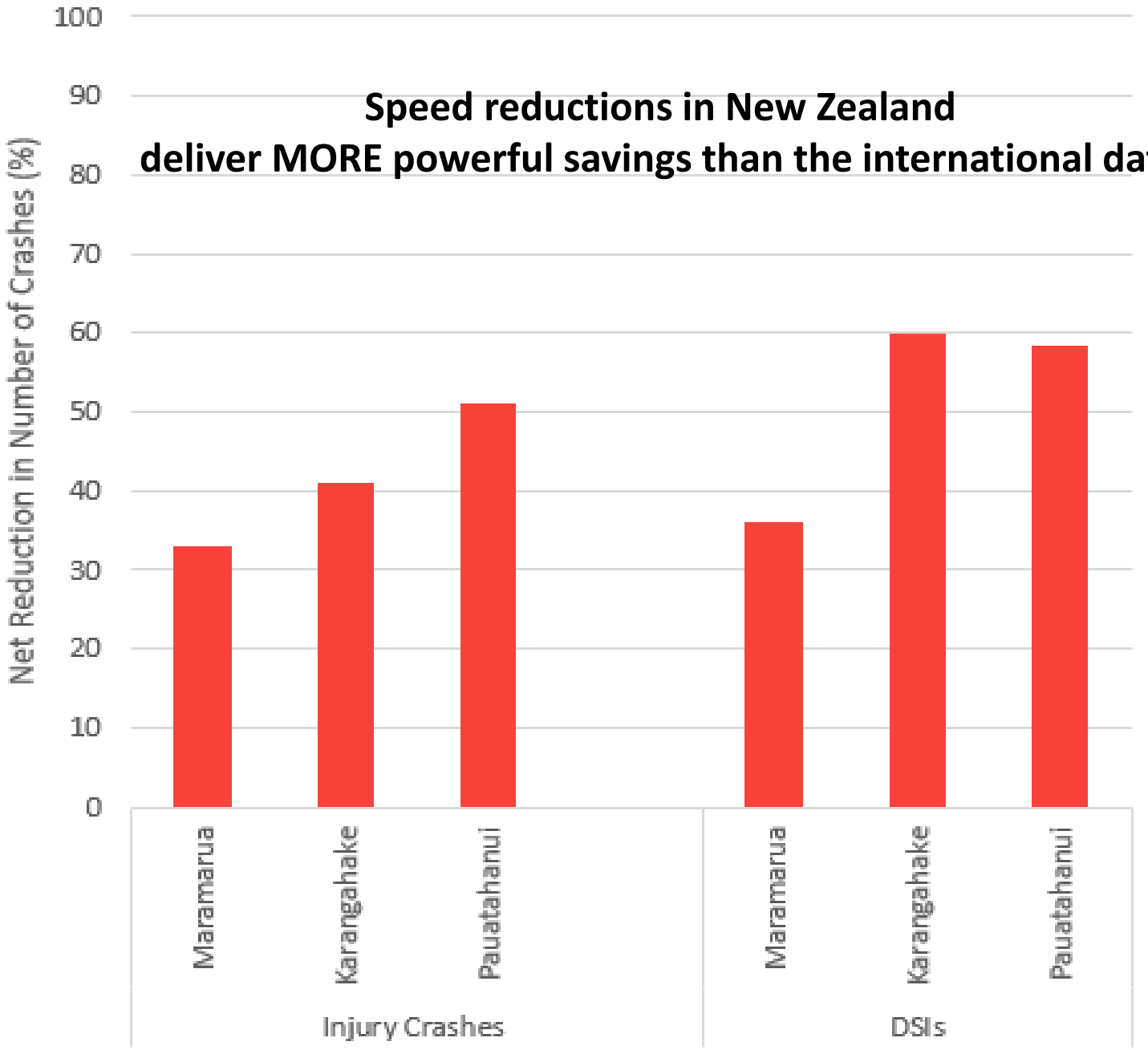
100kmh to 80 or 90kmh

Data: 5 year - before to after serious crash reductions

Net = compared with control locations with no change in speed limit

Speed reductions in New Zealand deliver MORE powerful savings of deaths and serious injuries than the international data predict

Source for examples: Job & Brodie, 2022



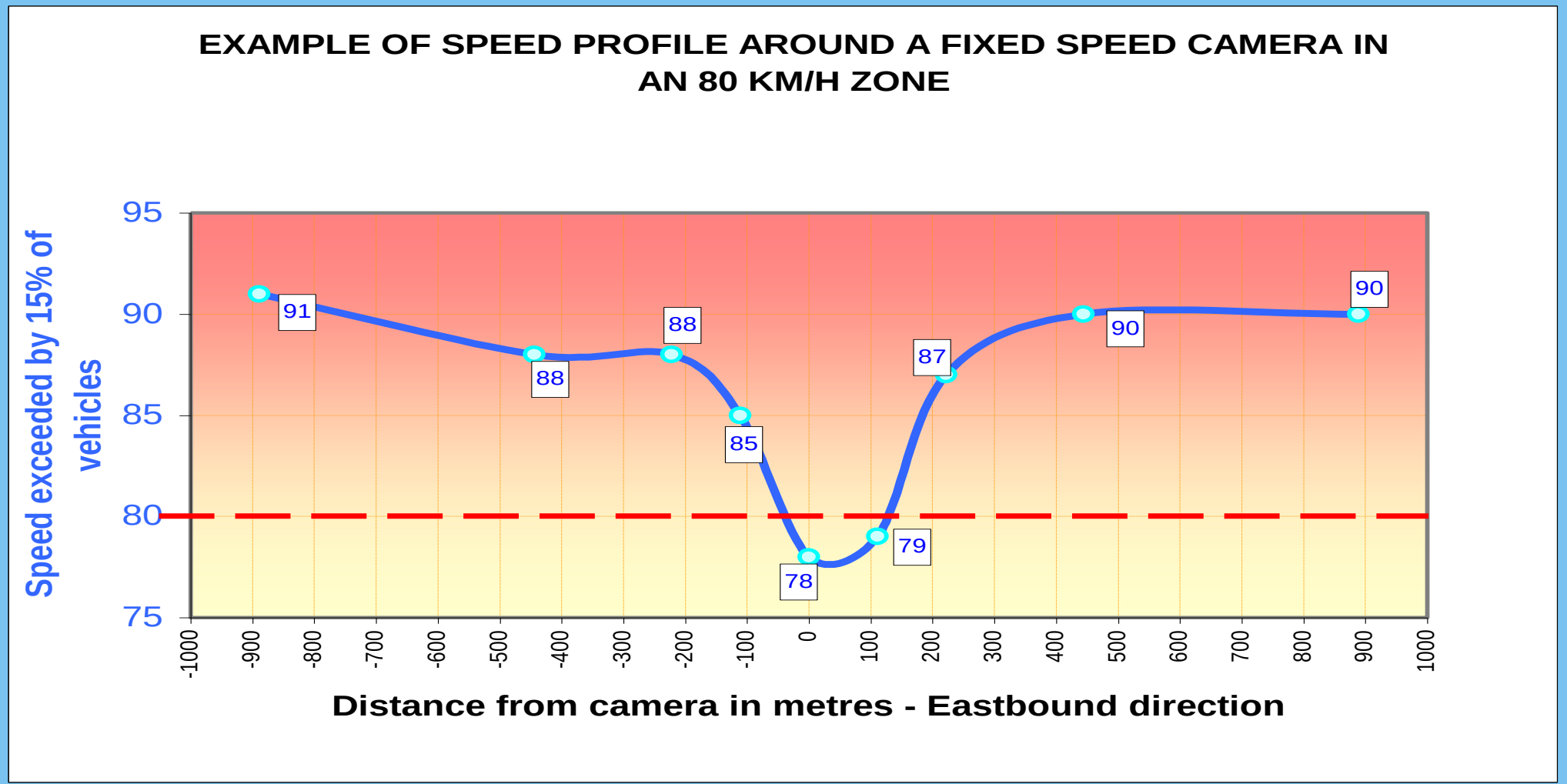
New Zealand in particular (and elsewhere)

Lowering speeds consistently reduces serious crashes:

Methods	Proven effects in New Zealand	Proven effects elsewhere
Lower speed limits	Previous 3 slides & many examples including on highways, at specific intersections, and in cities, most recently Auckland	Many examples, many countries- earlier slides
More effective speed enforcement (general deterrence)	Examples include covert speed cameras	Many examples, many countries- earlier slides
More effective penalties for speeding	Penalties are low in New Zealand- an important area of opportunity to save lives	Not regularly evaluated in Road Safety. Example successes: NSW Australia penalty change for P1 drivers (35% reduction in speed-related deaths)
Speed managing infrastructure	Examples include gateway treatments	Many examples, many countries- earlier slides

2 Points:

1. Fixed cameras are very effective at specific locations- not enough in New Zealand
2. The VAST VAST VAST majority of speed is deliberate



Speeding by 5kmh in an urban area DOUBLES SERIOUS CRASH RISK
Low level speeding is the main problem, not extreme speeds

Can calculate the contributions of each level of speeding (not from crash data which miss many speeding crashes in New Zealand- as covered earlier)

Results for New Zealand

In 50 kmh zones:

- Speeding by up to just 5 kmh over the limit are contributing almost half (49%) of the speeding fatal crashes
- Speeding by 10 kmh or less in total are contributing 84% of the speeding fatal crashes
- The extreme speeding (those speeding by 25 kmh or more over the limit) are contributing 1% of the speeding fatal crashes

Focus on extreme speeders is convenient, but is only addressing 1% of the speeding problem.

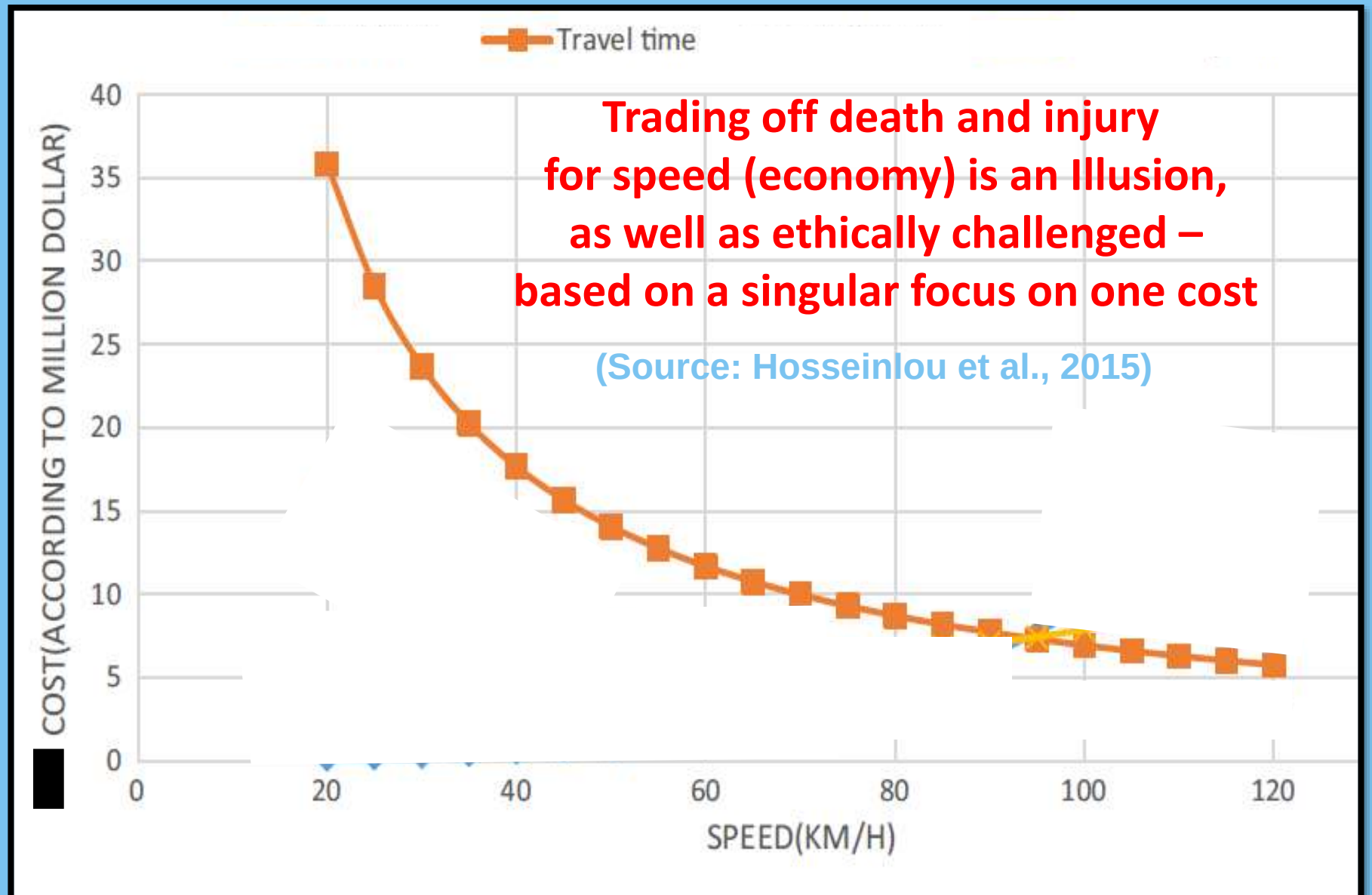
(Source: Report to be published soon)

Relevance for Driver Education

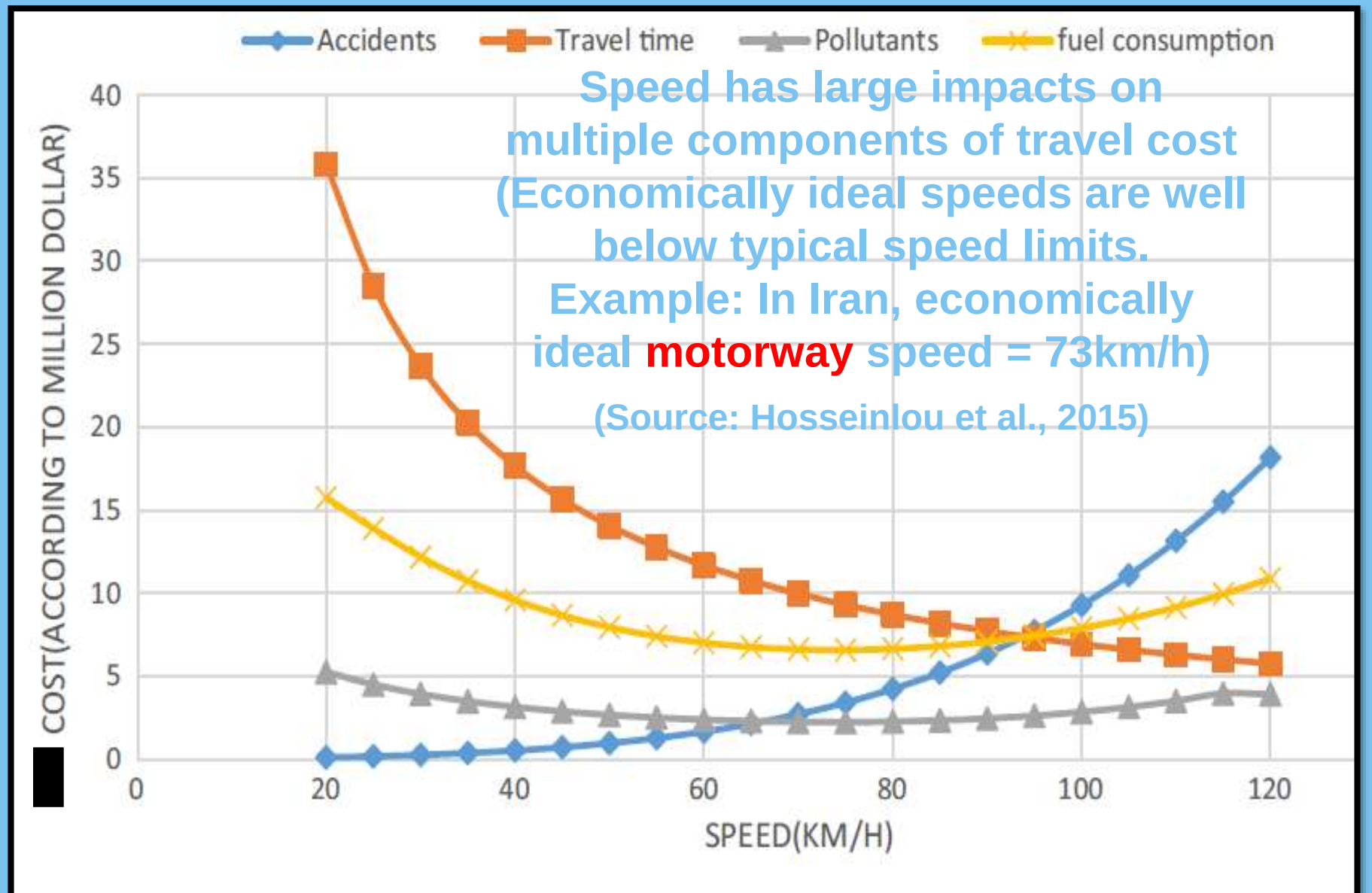
1. Aim to have drivers appreciate the vital role of speed in crash occurrence and severity, absolutely including in New Zealand
2. Strongly promote to learner drivers speed limit compliance & selecting lower speeds as conditions dictate
3. Explain that low level speeding is a large contributor to deaths in New Zealand (and how personal experience will not reveal this)
4. Explain the deliberate nature (and motivational nature) of speeding

Broad Topic 3: The misunderstanding of the value of higher speeds

Commonsense Misjudgment of trading off lives and injuries for speed (economic gain)- supported by transport companies ….



b. Commonsense Misjudgment of trading off lives and injuries for speed



Economic Analysis for New Zealand (By Max Cameron)

Shows that with all costs considered:

1. The economically optimum speeds for New Zealand are lower than the default speed limits, except close to right for Freeways only.

   On undivided (rural) roads, depending on quality: ideal
   = 55-70kmh for trucks
   = 65-85kmh for cars

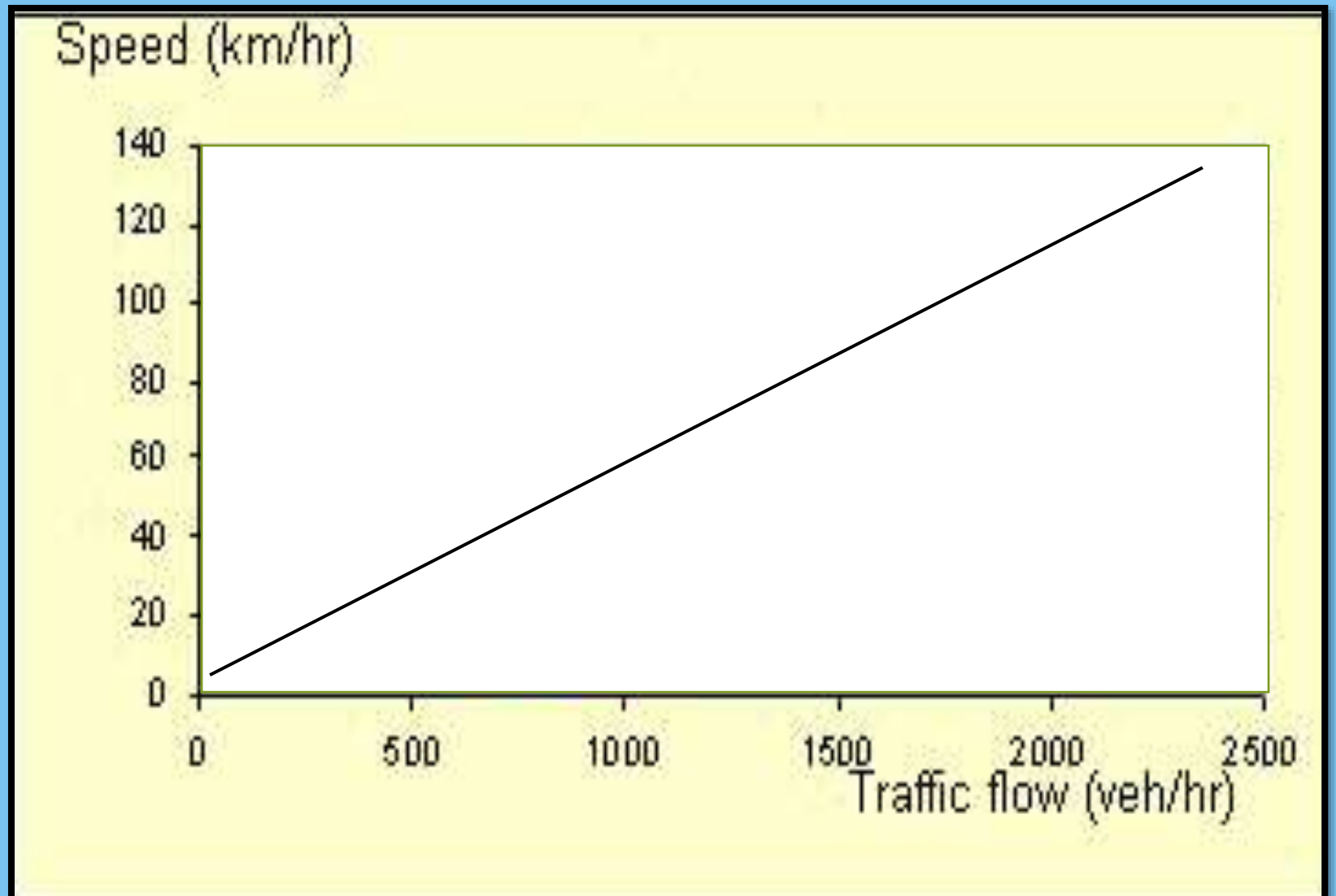
2. Was undertaken some years ago

   Several key costs are under-estimated: esp. related to
   - climate related emissions
   - the health costs saved from facilitating active transport

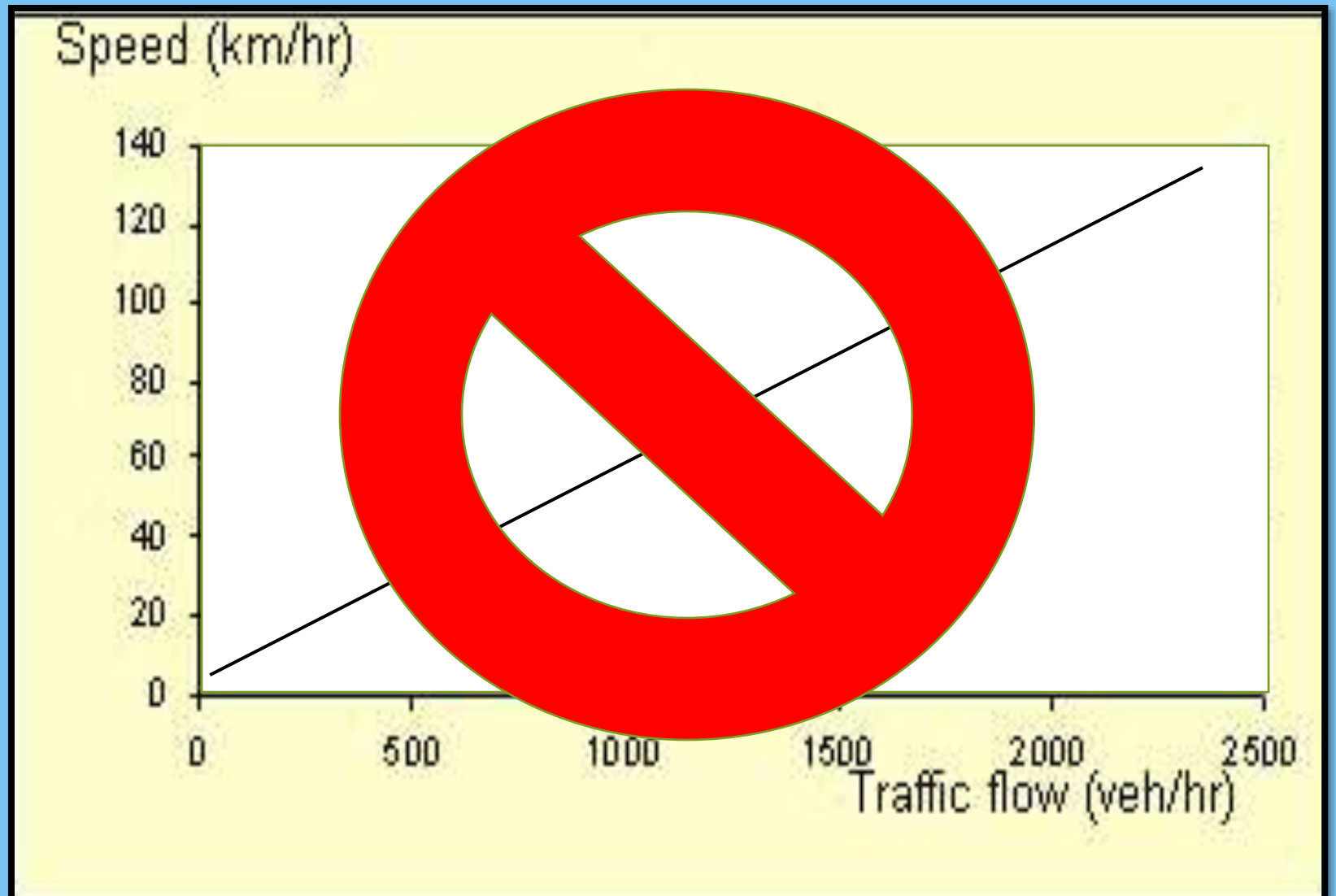
So,

Current ideal speeds for New Zealand are almost certainly lower than these numbers

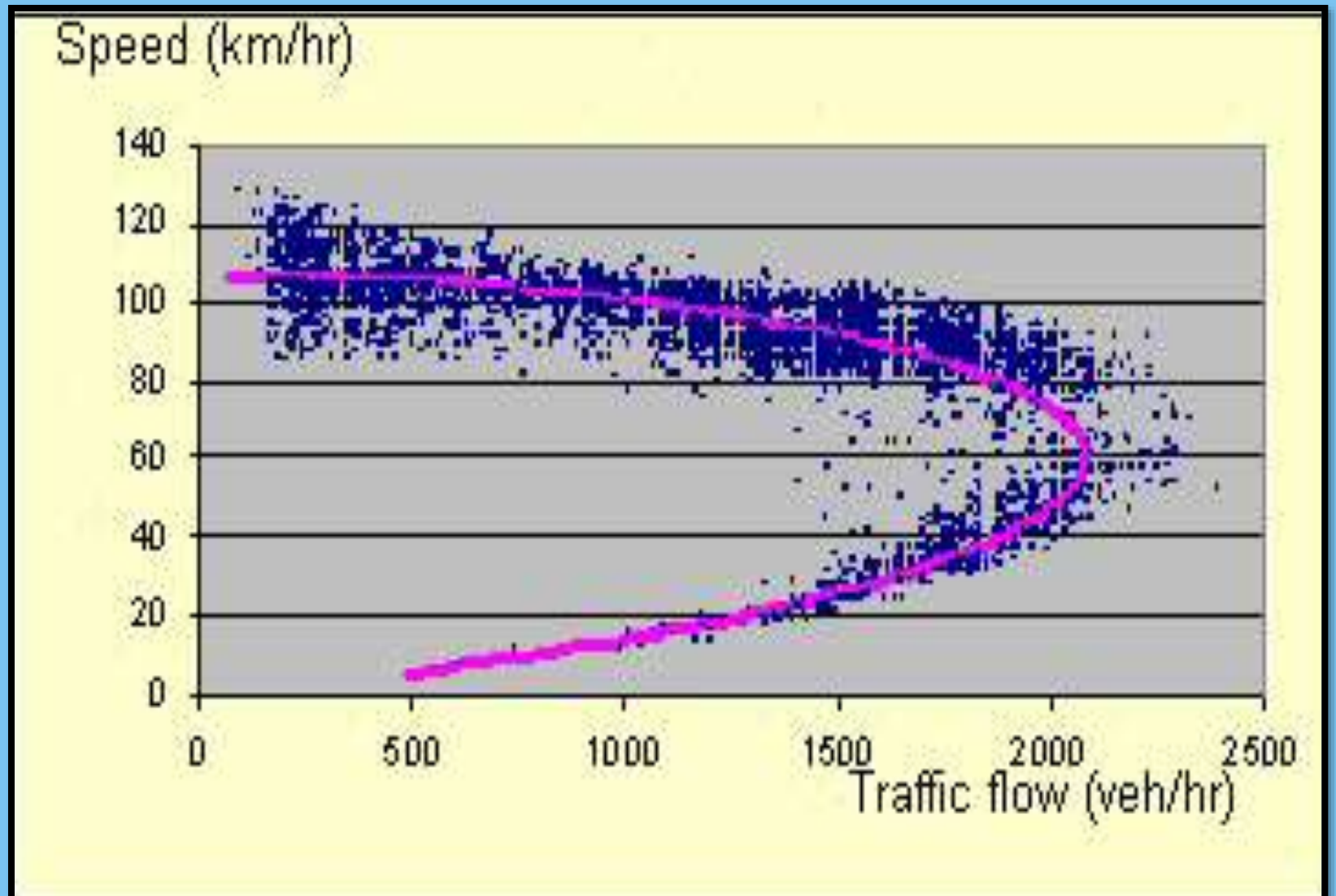
Commonsense Misjudgment of speed and congestion



Commonsense Misjudgment of speed and congestion



Real relationship between speed and traffic flow (Source: OECD, 2006)



Relevance for Driver Education

1. Promote to learner drivers the absence of the supposed economic and congestion solving value of high speed

Broad Topic 4: Managing speed versus alternatives solutions

Underlying psychological errors

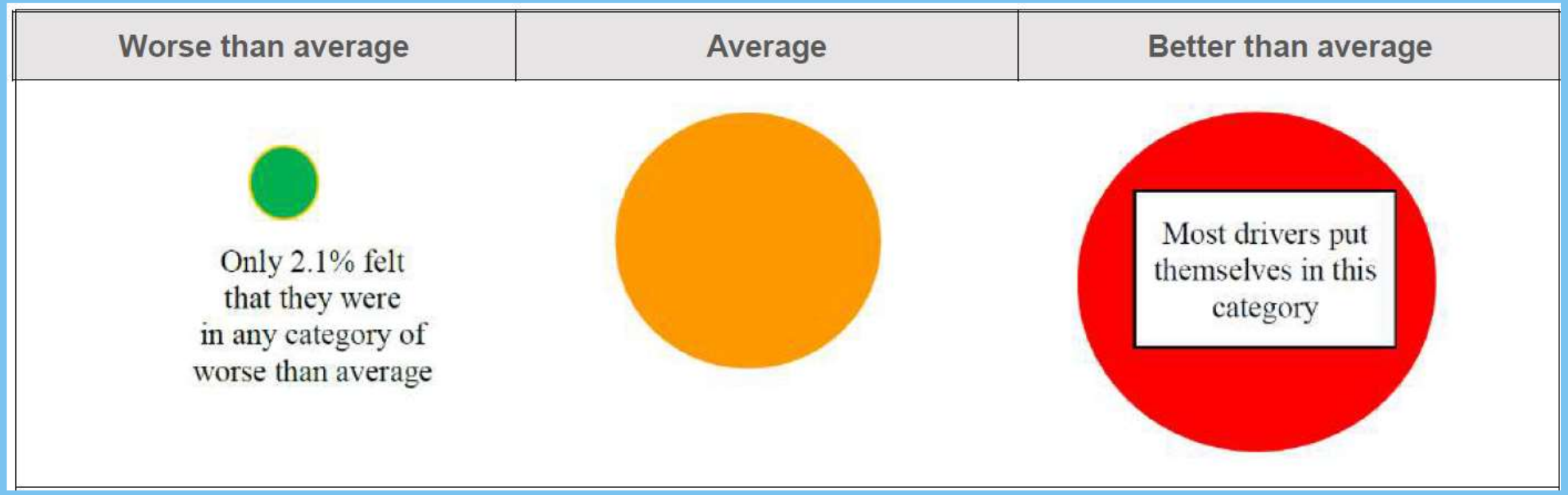
Error: Road safety (in respect of road users) is a skill and knowledge problem

Evidence: Road safety (in respect of road users) is a **motivation** problem

- Speeding
- Drink-driving
- Drug-driving
- Not wearing a safetybelt
- Not wearing a helmet
- Even fatigue driving (there is evidence on this)

Underlying psychological errors:
Misjudgment of personal risk (evidence)

Optimism bias& driver overconfidence



Source: Adapted from Job (1990). Studies show similar effects in New Zealand

Note: car handling skill training

There are two ‘alternative’ treatments- really treatments to be combined with speed management

Safe roads

Safe vehicles

(i.e., Safe System

Relevance for Driver Education

- Aim to have drivers appreciate the vital role of speed in crash occurrence and severity, including in New Zealand

- Identify the problems of Optimism Bias and Driver Overconfidence/ invulnerability.
  - Telling them they are vulnerable will not work
  - One approach shown to work to reduce these psychological errors seeing that almost everyone thinks the same. This work s well in a group setting- asking everyone to rate themselves at once **compared with others of the same age and level of driving experience.**

Take Home Messages & Recommendations

Additions to core education that will help road safety delivery in New Zealand, if understood by learner drivers:

- Understand the fundamental role of speed in crash occurrence and severity
- Understanding the lack of economic etc. value in higher speeds
- Increasing drivers understanding of, and support for, Safe System
- Understanding that road safety is a motivation problem
- Reducing optimism bias/driver overconfidence/personal invulnerability

I hope this has been helpful

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