

WHAT MAKES SAFE SYSTEMS SAFE?

Prepared by: Jim Langford
Monash University Accident Research Centre

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A Report on the SUNflower Project¹

1. A BRIEF STATEMENT OF THE ISSUE

Over the last decade in particular, Sweden, the United Kingdom (UK) and the Netherlands have consistently been amongst the best performed nations in terms of safe road performance. A detailed understanding of the reasons for their success should assist other countries in improving their road safety records, as well as possibly leading to further improvements in those three countries.

2. AN EXTENDED ASSESSMENT OF THE ISSUE

Table 1 compares the road safety performance of Sweden, the UK and the Netherlands with other OECD countries generally and with Australia and New Zealand².

Table 1: Transport deaths per 100,000 population in select countries, 1975-2004.

Countries	Transport deaths per 100,000 population										
	1975	1985	1995	1997	1998	1999	2000	2001	2002	2003	2004
Sweden	14.3	9.7	6.5	6.1	6.0	6.6	6.7	6.2	6.0	5.9	5.3
United Kingdom	11.9	9.4	6.4	6.3	6.0	6.0	6.0	6.1	6.0	6.1	5.6
The Netherlands	17.1	9.9	8.6	7.5	6.8	6.9	6.8	6.2	6.1	6.3	4.9
OECD median	18.5	15.1	12.3	12.3	11.5	11.3	11.0	11.5	10.8	9.5	9.5
Australia	26.6	18.6	11.2	9.5	9.4	9.3	9.5	8.9	8.7	8.2	7.9
New Zealand	20.0	22.6	15.9	14.4	13.2	13.4	12.1	11.8	10.3	11.5	10.7

Source: ATSB (2006).

Sweden, the UK and the Netherlands consistently have road user fatality rates well below the OECD median rate over the period 1975-2004. These three countries, in common with other countries, have shown substantial reductions over the three decades, with the levelling out in fatality rates in recent years showing early indications of further reductions in 2004.

Given the leading performance of the three so-called SUN countries (**S**weden, **U**K, **N**etherlands), the SUNflower study was undertaken as a collaborative effort involving the National Road and Transport Research Institute (VTI) in Sweden, the Transport Research Laboratory (TRL) in the UK and the SWOV Institute for Road Safety Research in the Netherlands. The study aimed to identify those individual factors responsible for road safety improvements in each of the SUN countries and where appropriate, transfer those factors to further improve road safety practices elsewhere.

It was also intended that the approach used in making meaningful comparisons of the three countries, would be available and relevant to other countries seeking to assess and improve their road safety performance.

3. A REVIEW OF THE RESEARCH

3.1 The SUNflower methodology

The study has used a benchmarking approach to compare the three countries, based on a road safety target hierarchy taken from New Zealand's Road Safety Strategy. The hierarchy is shown in Figure 1³.

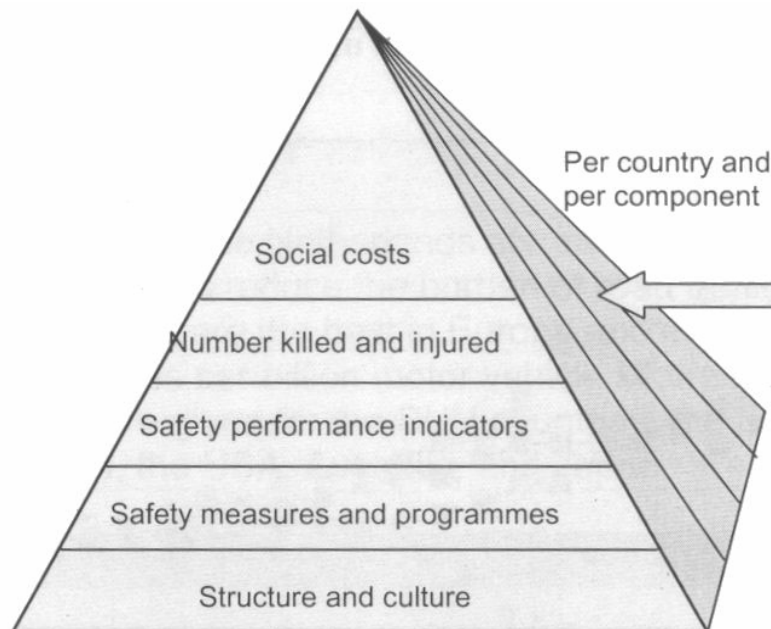


Figure 1: A target hierarchy for road safety

Each level on the target hierarchy may be influenced by two broad sets of factors. First there are external factors capable of differing markedly across the three countries: for example, dark and snowy winters that are more severe in Sweden than elsewhere, the particular risks posed by the many canals in the Netherlands and the longstanding use of roundabouts in the UK. Secondly there are different reporting practices across the three countries – especially differing amounts of under-reporting of crashes and different ways of categorizing crashes and crash circumstances. The differences in external factors and reporting practices need to be carefully considered in any comparison of the three countries, particularly in regard to assessing the impact of their road safety programs upon safety performance indicators and final outcome measures.

The approach adapted from New Zealand's road safety target hierarchy and comparing Sweden, the UK and the Netherlands, has been applied to four main road safety issues (or case studies):

- drink driving – including a historical overview of policies in the three countries, the common and different aspects of current policies, compliance strategies and changes in drink driving trends and conclusions drawn from these data
- seatbelts – including the common and different aspects of current policies and the various compliance strategies. Present seatbelt wearing trends are also presented, with deviations in wearing rates tagged to policy, tactics and operational differences
- low cost infrastructure improvements in urban areas and on minor roads – including 30 km/h area treatments, roundabouts, black spots and pedestrian and cyclist measures. As well as comparing and contrasting infrastructure improvement policies in each country, the tactics, funding and operational aspects are also considered in association with their influence on fatal crash outcomes
- infrastructure of high quality inter-urban roads – treated as above.

The findings arising from these four case studies, as well as being used to make safety recommendations specific to the four areas, have been combined with other findings outlined in the following sections, to make overall recommendations for the three countries.

3.2 Organization of road safety in the SUN countries

There are marked differences in the transport systems across the three SUN countries which would be expected to affect safety performance, particularly at the level of different road user groups. For example:

- Sweden has a relatively low traffic density, with less of its driving being along motorways. Both factors produce a higher expected risk for car occupants
- the UK has a high traffic density, leading to decreased risk for car occupants but a heightened risk for pedestrians
- Dutch drivers make the heaviest use of motorways relative to drivers in the other two countries, also leading to an expected low risk for car occupants.

These differences notwithstanding, the three countries are similar in their organization of road safety activities:

- all three countries have a similar organizational structure, consisting of a strong, national body coordinating safety activities across regional and local authorities and across various stakeholder groups, backed by strong central funding commitments
- all three countries have developed national safety programs which include quantified injury reduction targets that are regularly monitored over the life of the program. Target setting has been identified as an important safety feature that serves to keep road safety on the political agenda, while acting as a management tool to define responsibilities and activities across the many layers of stakeholders
- all three countries have similar road safety priorities (speeding, drink driving, infrastructure, vulnerable road users and so on). However there are differences in the timing of countermeasure implementation and in the underlying legal bases (for example speed limits and blood-alcohol levels)
- the three countries differ in what is considered to be one important regard.

- The road safety programs in both Sweden and the Netherlands are underpinned by explicit philosophies or visions (Vision Zero and Sustainable Safety, respectively). In contrast the UK program is based more directly on good safety practice targeting individual problem areas or priorities. As both Vision Zero and Sustainable Safety are relatively new (effectively starting in 2000 and 1998, respectively), it is too early to judge the full contribution of these different bases to road safety improvement.

3.3 Current road safety performance in the SUN countries

Table 2 shows that for the year 2000, the fatality rates per population and per vehicle-kilometres for the three SUN countries.

Table 2: Transport deaths per 100,000 population and per billion vehicle-kilometres in Sweden, the United Kingdom and the Netherlands, 2000.

Country	Fatality rate 2000:	
	Per 100,000 population	Per billion vehicle-kilometres
Sweden	6.7	8.4
United Kingdom	5.9	7.3
The Netherlands	6.8	8.5

Source: Wegman, Lynam and Nilsson (undated)

There were few differences in fatality rates between the three countries, whether considered per population or per vehicle-kilometres. The main differences related to the UK fatality rates, which were lower than those for Sweden and the Netherlands - and the differences were statistically significant.

Differences between the three countries were more marked once individual road user groups were considered:

- Sweden had the highest car occupant fatality rates, especially when compared to the UK (4.3 per billion vehicle kilometres, compared to 2.9). When this difference was further explored, controlling for countries' different use of the motorways, it remained that the UK still had a substantially lower fatality rate. The difference was attributed to the UK's lower travel speeds due to higher traffic density
- the UK's greatest safety problem was unprotected road users (motorcyclists, cyclists and pedestrians) where in all three instances, the per distance rates were the highest of the three countries
- the Netherlands' greatest safety problem was in regard to mopedists.

(While other casualty data for the three countries were available, direct comparisons were difficult, especially because of differing measures of under-reporting.)

3.4 Using past trends to inform future policies in the SUN countries

The past safety performances of the three countries have been compared, based mainly on activities and developments during the period 1980-2000.

The improvements in fatalities over this period have been reasonably consistent across the three countries. These improvements were also reasonably consistent for all road user groups across the three countries – except for motorcyclist fatalities in the UK, which have shown little improvement over the most recent ten years. (The UK went from having the lowest per-distance motorcyclist fatality rates in 1987 to the highest by 2000.) The other major difference is the slowing of the overall improvement trend in car occupant casualty rates in the Netherlands (although for earlier periods, improvements in the Netherlands were considerably greater than elsewhere).

Around one-half of the improvements over this period were attributed to so-called ‘headline’ policies: increased use of seat belts, reduced drink driving and improved vehicle safety. Around one-third of the reductions were attributed to countermeasures for vulnerable road users, especially in Sweden and the Netherlands (mainly through infrastructure improvements and reduced speed limits): in the UK, more modest countermeasures accompanied by reduced exposure for this group. Road engineering measures were seen to contribute a further 10%-20% of the overall improvement.

The past performances of each of the three countries were used to identify possible future improvements. These included:

- greater scope for improving the safety of vulnerable road users in the UK, especially through adopting the Vision Zero and Sustainable Safety practices to reduce traffic flow levels and speed in built-up areas
- greater diversion of traffic onto motorways, as exemplified in the Netherlands. Today Dutch motorways account for more than 40% of all vehicle-kilometres, compared with 20% in the UK and 14% in Sweden
- more infrastructure improvements along the UK’s network of 2-lane carriageways, especially through intersection and access improvements.

3.5 Recommendations for future road safety measures in the SUN countries

Based on the assessment of the road safety situation in the three countries, a number of recommendations for further improvement have been identified.

Sweden

The main difference between Sweden and the other two countries was the low traffic volumes on Swedish roads. This was attributable largely to strong seasonal differences, the low density of the population and the long distances between urban areas. The result has been a higher standard of roads, which has had a conflicting impact on safety: on the one hand, a lower crash rate but on the other, the higher travelling speeds have meant crashes with more severe outcomes. The extensive road network combined with low traffic density means that speed (and other) enforcement measures will have limited impact. These factors have resulted in Sweden having the greatest car occupant fatalities – with this group identified as the primary road safety target, especially through increased seatbelt actions.

While few readily useable countermeasures have been identified for Sweden, a number of issues needing further investigation were listed, including speed management (including enforcement strategies), 'the winter problem' and an appraisal of the different urban transport systems and their interaction.

The UK

It was noted that while car occupant fatalities in the UK were the lowest of the three countries, this was not the case for other road user groups. Increased use of 30 km/h speed limits for urban streets was seen as an immediate possible step, along with engineering treatments targeting cyclists and pedestrians using other urban roads.

Of the three countries, the UK had the lowest proportion of roads designated as motorways. Accordingly, further infrastructure improvements to the network of dual carriageways, especially intersections, were also recommended. In addition, better speed management along single-lane carriageways was recommended.

It was also recommended that Britain reduce its blood alcohol content limit for drinking and driving from 0.08% to a maximum of 0.05%.

The Netherlands

While recognizing the substantial safety improvements made in the Netherlands, several areas for improvement were identified:

- moped per distance fatality rates were twice as high as in the other two countries. As there were no obvious causes for this, it was recommended that this issue be further investigated as a priority
- drink driving rates remained high, relative to the other two countries. It was recommended that the management practices used elsewhere be assessed, with view to being used in the Netherlands
- seatbelt use was significantly lower and it was considered that education and enforcement strategies similar to those employed in Sweden and the UK should make a substantial impact on this problem
- despite efforts to date – especially the widespread use of 30 km/h speed zones and cycling facilities – deaths on urban streets are still the highest of the three countries. Reasons for this need to be identified and resolved.

It was recognized that the comparison of the three countries and the validity of any arising findings depend on the availability of high-quality comparable data. It was found that even with regard to these three countries only, there were many data limitations, not the least being differences in crash definitions and under-reporting. More subtly, there were often inadequate data to fully measure and take account of the transport-related background differences between the three countries: in particular, speed differences across the different road types in each jurisdiction were often not available. Accordingly it was recommended that firmer conclusions and recommendation require a program of comparative research to meet these data needs.

4. POLITICAL, SOCIAL AND OTHER FACTORS

It is always a politically sensitive task for a jurisdiction to compare its performance with the performance of others – particularly so, if the others are leaders in the field. It is also a difficult task practically, given that there are invariably genuine differences between jurisdictions which make it very difficult to interpret the results of comparisons. Looking at the Australian road safety situation in particular, these political and practical difficulties are increased by the relative independence of the different State and Territory jurisdictions and the (at times) marked differences in programs and performance across these different authorities.

The extent to which Australia is currently in a position to profit by undertaking its own comparison with particularly the SUN countries is uncertain. On the one hand, it may be more productive in the short term to undertake this type of exercise initially on an internal basis through comparing the programs and performance of the different local jurisdictions. On the other hand, the political heat that this exercise would be expected to generate might be best dispersed by individual jurisdictions undertaking a more 'detached' comparison, perhaps with the SUN countries.

5. CONCLUSIONS

The SUNflower study represents an ambitious attempt to compare the road safety performance of three highly successful countries across a range of benchmarks. It has attempted to explain the factors underlying identified differences and has presented a series of recommendations aimed at improving road safety performance not just in the three SUN countries but also elsewhere.

The value of this exercise is not to be doubted. The will for Australasian jurisdictions either individually or collectively to replicate this exercise, remains to be tested.

REFERENCES

- ¹ Unless otherwise indicated, the contents of this paper have been taken from the following two publications:
Koornstra M., Lynam D., Nilsson G., Noordzij, P., Pettersson H-E, Wegman F. and Wouters P. (2002). SUNflower: A comparative study of the development of road safety in Sweden, the United Kingdom and the Netherlands. SWOV, Leidschendam;
Wegman F., Lynam D. and Nilsson G. (undated) SUNflower: A comparative study of the development of road safety in Sweden, the United Kingdom and the Netherlands. Paper available from the following website: <http://sunflower.swov.nl>.
- ² Australian Transport Safety Bureau (2006). International road safety comparisons: The 2004 Report. Commonwealth of Australia.
- ³ NRSC (2000). Road Safety Strategy 2010. A consultation document. National Road Safety Committee, Wellington, New Zealand.