

Summary

Mini scenario: Mandatory restrictive in-vehicle safety measures – Expected effects on number of road fatalities and severe injuries

TOI Report 1579/2017

Author: Fridulv Sagberg

Oslo 2017 14 pages Norwegian language

The report describes a scenario implying mandatory systems preventing driving under the influence of alcohol, above speed limits and/or without a valid driver's licence, for all new motorised vehicles. Introducing such a requirement for all new passenger cars from year 2020 will save at least 80 lives and 329 severely injured persons in the period 2020-2030. This is estimated by analyses of data from fatal road crashes in Norway during the years 2005-2014, data about car renewal rate, and prognoses for road crashes without implementing new countermeasures. The estimated reduction in fatalities and injuries will be even larger if a mandatory implementation is extended to include motorcycles and mopeds. The reduction would also be larger if the measures were combined with a faster renewal of the vehicle fleet.

Speeding, driving under the influence of alcohol, and unlicensed driving are risk factors that contribute to a large number of serious road crashes. Measures to eliminate these factors therefore have a large potential for increasing traffic safety.

The present report describes a scenario where all new motorised vehicles are equipped with technical systems preventing speeding, driving while influenced by alcohol, and/or driving without a valid licence. The scenario implies implementation of the following three systems: 1) alcolock, 2) intelligent speed limiter (connected to a speed limit database), and 3) electronic driver authentication (implying that drivers must identify themselves by unique information, like a national identity number in combination with a PIN code or biometric data before getting access to a motorised vehicle).

In the project reported here, we have estimated the effects of those systems, both separately and in various combinations, on the number of road fatalities and severe injuries. There is a considerable overlap between the prevalence of alcohol influence, speeding, and unlicensed driving as contributing factors in crashes. The total effect of the three technical systems in this scenario is therefore expected to be less than the sum of the effects of each separate system.

Our estimates of the effects of the systems are based on data from in-depth analyses of all fatal road crashes in Norway during the years 2005-2014, carried out by accident investigation teams of the Norwegian Public Roads Administration (NPRA). We have counted the percentage of crashes where speeding, alcohol influence and/or unlicensed driving was present for the at-fault driver, separately for each factor and also for all possible combinations of the three factors. The percentage of crashed with these factors contributing is taken as an indication of the potential share of crashes that can be prevented by a combination of alcolock, speed limiter, and driver authentication, assuming that the systems are one hundred percent effective.

Figure S-1 shows the percentage of passenger car crashes with various combinations of the three risk factors. In total, one or more of those factors contribute to 20.3% of all fatal crashes (i.e., the sum of all percentages in Figure S-1. We also see that there is a considerable overlap between the factors; more than one factor is present in 10% of crashes, and all three in 1.2%.

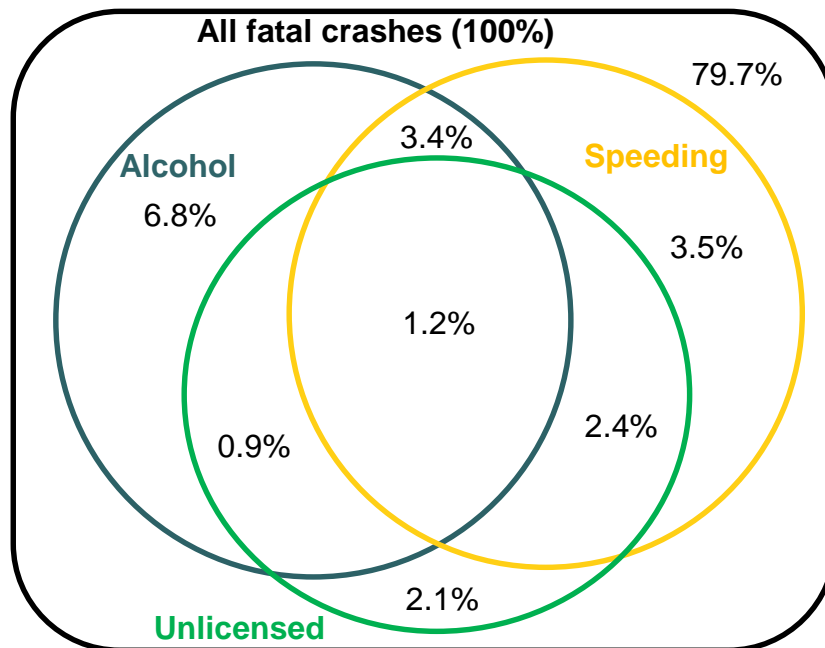


Figure S-1. Fatal car or heavy vehicle crashes 2005-2014, by contribution of alcohol influence, speeding, and/or unlicensed driving. Percent. Speeding is defined as speed above the limit for immediate licence withdrawal, which is considerably higher than the speed limit.

This is probably a too low estimate, because speed-related crashes in these analyses include only those where speed was judged to be “considerably above the speed limit”; which was defined by NPRA as above the criterion for licence withdrawal. In addition, there was a larger number of crashes where the speed was judged to be too high for the conditions. In several of these crashes, speed was above the speed limit, and consequently some of the crashes could have been prevented by a speed limiter. We do not know many of the crashes with too high speed for the conditions actually involved speeding above the speed limit, but if we include all crashes with too high speed for the conditions in our estimates, the total effect goes up from 20% to 33% of all crashes. The “true” share of crashes expected to be prevented if all passenger cars had the three mentioned systems installed is likely to be somewhere between the two estimates.

If in addition we assume that a mandatory installation of alcolock, speed limiter and driver authentication include even motorcycles and mopeds, the percentages above will increase by 3.4%, to approximately 24 and 37% respectively, for the lower and upper estimates.

The scenario implies that the restrictive systems are made mandatory for all new motorised vehicles from a certain date. Consequently, the full effect of the measures will not be achieved until the whole car fleet has been renewed. Based on data for current passenger car renewal rate, relationships between vehicle age and driving distance, and expected crash counts without implementation of new measures, we have estimated the expected

reduction in number of killed and severely injured road users in car crashes, given the percentage effects shown in Figure S-1.

If the systems are made mandatory for passenger cars from the start of year 2020, the expected gain in safety for the period 2020-2030 will amount to 80 fewer killed and 329 fewer severely injured road users, as a minimum estimate. The maximum estimate, based on somewhat different assumptions, is a gain of 131 fewer killed and 539 fewer severely injured road users. These estimates will be higher if the systems are required for motorcycles and mopeds as well.

Among the three countermeasures implied in this scenario, alcolock yields the largest single contribution to crash reduction. This measure alone for passenger cars is expected to prevent at least 13.3% of fatal crashes. The additional expected effect of the two other systems will be at least 6.7% of the remaining crashes for speed limiter, and 5.1% for driver authentication. Speed limiter alone is expected to prevent at least 10.5% of fatal crashes, and driver authentication alone 6.6%.

The results should be interpreted with some caution. For example, we have assumed that the systems are one hundred percent effective regarding prevention of crashes related to either speeding, alcohol influence or unlicensed driving. This may be a reasonable assumption for alcolock and driver authentication, since such systems actually prevent driving. Regarding speed limiter on the other hand, some of the crashes occurring with speeds above the limit may conceivably have happened even with speeds below the limit. This will reduce our estimates of safety improvements somewhat. A limitation with opposite weight is that we have not included heavy vehicles (and only to a limited extent motorcycles and mopeds) in our estimates. Thus, we conclude that our estimates are reasonable for the effects to be expected for a scenario with the restrictive systems installed in all types of motorised vehicles.

In this project we have not considered the preconditions for (not to mention the barriers against) getting this scenario realised. There are clearly several political, organisational, administrative, legal, and technical challenges to be managed in order for the scenario to reach fulfilment. Anyway, knowledge about expected effects of the scenario is assumed to be an important impetus towards trying to find solutions to these challenges.