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Characteristics of fatal road crashes involving unlicensed drivers or riders: Implications for countermeasures

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ABSTRACT

Drivers or riders without a valid license are involved in 10% of fatal road crashes in Norway. This was shown by an analysis of data from all fatal crashes in the period 2005–2014. A literature review shows that unlicensed drivers have a considerably increased crash risk. Such crashes could be prevented by electronic driver authentication, i.e., a technical system for checking that a driver or rider has legal access to a vehicle before driving is permitted. This can be done by requiring the driver/rider to identify themselves with a national identity number and a unique code or biometric information before driving may commence. The vehicle thereafter verifies license availability and vehicle access by communication with a central register. In more than 80% of fatal crashes with unlicensed drivers/riders, speeding and/or drug influence contributed to the crash. This means that a majority of crashes with unlicensed drivers alternatively could be prevented by already available systems, such as alcolock and speed limit dependent speed adapters. These systems will have a wider influence, by preventing crashes also among licensed drivers. Mandatory implementation of alcolock, speed limiter, and electronic driver authentication in all motorized vehicles is estimated to prevent up to 28% of fatal road crashes, depending on effectiveness of the systems.

1. Introduction

Studies from several countries indicate that a considerable share of road crashes are caused by drivers or riders without a valid license. Most estimates from Australia and USA indicate that unlicensed drivers/riders are involved in between 10% and 20% of fatal crashes (Watson, 2003, 2004; Watson and Steinhardt, 2007; AAA Foundation for Traffic Safety, 2011; Baldock et al., 2013). In Europe, there is a lack of studies on unlicensed drivers/riders and crash involvement. The only results we have found come from a study of Belgian police reports from fatal crashes on Belgian motorways (Slootmans and De Schrijver, 2015), showing that 2.9% of involved drivers were unlicensed. This is clearly lower than the estimates from Australia and USA, even if we take into consideration that it is based on number of involved drivers rather than number of crashes. Since we have found no other European studies, and the only study includes only motorway crashes, there is clearly a need for more studies of unlicensed driving and serious crashes in Europe.

It should be noted that the problem of using a motorized vehicle without a valid license also concerns riders of powered two-wheelers, in addition to drivers. Therefore, for simplicity we use the term 'unlicensed drivers/driving' here to refer to both these vehicle categories.

Unlicensed driving is a traffic safety issue only to the extent that unlicensed drivers are at a higher risk than other drivers; in other words, if the share of unlicensed drivers is higher in crashes than in driving generally. Unfortunately, data on unlicensed driving in general are scarce. According to Sweedler and Stewart (2007), a report from the UK Department of Transport (Knox et al., 2003) found that unlicensed drivers account for less than one percent of total hours driven. If this figure is generally valid, the share of unlicensed drivers in crashes is several times higher than their share in traffic, showing that their crash risk is clearly elevated. This conclusion is also supported by several estimates of relative risk based on case-control studies (DeYoung et al., 1997; Watson, 2004; Blows et al., 2005; Brar, 2012). Further evidence for unlicensed drivers' crash risk comes from the finding that odds ratios tend to increase with crash severity (Watson, 2004). In a study from Canada, Suggett (2007) found that there was a higher share of fatalities in crashes among unlicensed (3%) compared to licensed (1.4%) drivers.

It should be noted that investigating prevalence of unlicensed driving as well as estimating the associated crash risk is methodologically challenging. For drivers involved in crashes, such data are rather easily available, since license status ordinarily will be registered by police or other authority bodies investigating crashes. However, estimating crash risk requires exposure data as well, which means that one should know the proportion of driving taking place with unlicensed drivers or riders, and ideally the distribution of unlicensed driving in

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space and time. One way of circumventing the lack of exposure data is using the quasi-induced exposure case-control method, which compares the prevalence of a risk factor (unlicensed driving in this case) between at-fault and not-at-fault drivers, assuming that the proportion of not-at-fault drivers with the risk factor present represents the prevalence among drivers in general, at the times and places were accidents have occurred. This approach was used in the study by DeYoung et al. (1997) of crash risk among unlicensed drivers in California. There are, however, some limitations of this method, related e.g. to the allocation of fault to the parties involved in a crash. This may result in biased risk estimates; for example, ascribing fault to only one party in a two-vehicle crash is sometimes an over-simplification, since even not-at-fault drivers may have a higher risk of being involved in crash compared to an average driver. This bias will result in too low risk estimates, whereas a possible tendency to ascribe fault to the unlicensed driver just because this is something illegal will attenuate risk estimates. DeYoung et al. (1997) conclude that despite these limitations, "estimates yielded by the induced-exposure method are reasonable approximations that provide a better indication of the risks posed by ... unlicensed drivers than would otherwise be available" (DeYoung et al., 1997 p.22). The same method was used also in the studies in Queensland, Australia, by Watson (2004) and in California by Brar (2012), yielding similar results. A somewhat different approach was used in the case-control study by Blows et al. (2005) in New Zealand. The cases in this study were 615 killed or hospitalized drivers, whereas the controls were identified by randomly sampling of a comparable number of drivers at representative road sites. This study yielded odds ratios for unlicensed driving between cases and controls in the same order of magnitude as the relative risks from the other mentioned studies.

The relative risk estimates or odds ratios for crash involvement of unlicensed drivers are clearly significant in all these studies and vary between 2.6 and 11.1, which clearly demonstrates the overinvolvement of this group of drivers in crashes.

Unlicensed drivers have been found to be more frequently reported for other traffic violations as well. For example, speeding, drunk or drugged driving, and other negligence are clearly more frequent among unlicensed drivers (Watson and Steinhardt, 2007), a finding that explains much of their added crash risk.

Since the evidence of increased crash risk among unlicensed drivers is so strong, there is a need to get more detailed knowledge both about the prevalence of unlicensed driver crash involvement and about characteristics of those drivers and the crashes they are involved in.

The main purpose of the present study is to present an analysis of the prevalence of unlicensed driving among at-fault drivers for fatal crashes in Norway during the ten-year period 2005–2014, based on reports from in-depth investigations of all fatal road crashes. In addition, we investigate the prevalence of additional risk factors present among the unlicensed drivers, primarily alcohol influence and speeding. We will not attempt to estimate crash risk, since Norwegian data on unlicensed driving in general are not available.

Various ideas have been suggested regarding development of technical systems for preventing unlicensed driving, and thereby reduce the number of crashes. In discussing our results, we include a short overview of research regarding possible technological solutions to this problem. More specifically, we will estimate potential effects of a system for electronic driver authentication and make comparisons with expected effects of alternative or complementary measures like alcolock and intelligent speed adaptation.

2. Method

Our estimations of the share of crashes with unlicensed drivers are based on data from the accident investigation boards (UAG, "UlykkesAnalyseGruppe") of the Norwegian Public Roads Administration. The UAGs carry out in-depth investigations of all fatal crashes in Norway and write a comprehensive and detailed report from each investigated crash, based on on-the-scene observations, interviews with witnesses, police reports, vehicle and license register data, vehicle inspections, and in some cases computer-based crash reconstruction in order to estimate pre-crash trajectory and speed. The work of the UAGs is carried out in parallel with and independently of investigations by the police.

For the years 2005–2014 reports from 1850 fatal crashes were available, which include all fatal road crashes in that period. Key information from each crash investigation is recorded by the UAG in a database. The researchers in the present project had access to both the database and the detailed reports from each crash.

In Norway, a fatal crash is defined as a crash resulting in the death of a road user within 30 days after the crash. All crashes on public roads, as well as crashes involving motorized vehicles outside public roads are included. Crashes with clear indications of suicide are not included in the UAG database, nor are crashes where a driver dies before the crash because of a medical condition.

There is a code in the UAG database for "invalid license"; however, it turned out that license status data were incomplete for drivers who were obviously not at fault for the crash. Consequently, we have complete data on license status only for at-fault drivers, and there were no crashes where "invalid license" was registered for an innocent driver. Data from the database were supplemented with screening of individual reports from all crashes. This screening revealed some instances of "invalid license" for at-fault drivers which were missing in the database.

Unlicensed drivers include both persons who have had their license revoked or suspended, either due to traffic violations, health problems or other reasons, as well as persons who had never held a license. Drivers holding a license that is valid for a different vehicle category, but not for the vehicle they used in the crash, are also counted as unlicensed. The UAG database does not contain information about the different reasons for being unlicensed; all the mentioned reasons are coded as "unlicensed".

Information about stolen vehicles involved in fatal crashes was also available in crash reports, and this information was noted in the screening process in addition to license status.

For each crash with more than one motorized vehicle involved, different criteria were used for identifying the at-fault driver. A crash-involved driver violating a priority regulation was always defined to be at fault. For other crashes, the driver at-fault was defined by identifying the earliest instance of loss of control that contributed to the crash. The at-fault driver was identified as the driver of the vehicle losing control. This judgment was based solely on information about course of the crash, irrespective of legal considerations. This implies that an at-fault driver had not necessarily violated a traffic rule, and a traffic rule violation did not imply fault for the crash unless judged as a contributing factor. Drivers in single-vehicle crashes were always considered to be at fault.

We used the UAG database also to register speeding and alcohol influence among both licensed and unlicensed drivers involved in crashes. The crash investigation teams had coded speeding in two different ways. After estimating the likely pre-crash speed, based on braking or skid marks on the road surface, vehicle deformations, witness testimony, or computer-based crash reconstruction, they first judged whether the speed was too high for the driving conditions (road, weather, traffic, etc.) irrespective of speed limit. Second, they determined whether the estimated speed was above the limit for license revocation. Both judgments were coded in the database.

UAG data on alcohol influence is partly based on autopsies of killed drivers. For surviving drivers, data are based on breath or blood tests. Cases with values above the legal limit of 0.2% BAC (which is the same for full-license and probationary-license drivers) were coded as influenced by alcohol. It should be noted that there may be some under-reporting of alcohol influence, because drivers are not tested unless the police officer suspects influence.