Age based population screening for fitness to drive does not produce any safety benefits

This document is a brief summary of selected parts of the two Danish reports: "Aldring, demens og bilkørsel" (Siren & Meng, 2010) and "Helbredsmæssig kontrol ved ældre bilisters kørekortsfornyelse – Evaluering af de sikkerhedsmæssige effekter af demenstesten" (Siren & Meng, 2010), from DTU Transport, Denmark. (An article on the results of the empirical part of the latter report is forth coming entitled "cognitive screening of older drivers does not produce safety benefits").

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The rationale behind age based population screening for fitness to drive is to increase the road safety for both the older drivers themselves and for other road users. It intuitively makes sense to "remove risky drivers" from the driver population and thereby increase the road safety for all. Consequently, age-based screening of older drivers is used as a safety measure in most European countries.

However, there are two problems with this. First, older drivers generally do not have increased accident risk that calls for the society to invest in a costly age-based population screening, and second, according to research literature, aged based population screening does not succeed in producing the desired safety benefits.

Older drivers are generally safe drivers

Contrary to common belief older drivers are in fact generally the safest group of drivers. Various factors have contributed to the belief that older drivers are risky drivers.

For many years the U- shaped curve was often presented in talks about older drivers' accident risk. It illustrates accident risk as the number of accidents per exposure (driven kilometres) in different age groups. The curve shows a high accident rate for the youngest drivers, while the rate decreases for the middle aged group only to increase again at around the age of 65 – 70. The U-shaped curve has been interpreted to illustrate how chronological age as such influences the accident risk. However, recent research has identified biases that can account for the trend shown in the U-shaped curve and thereby document that increased chronological age per se is not associated with higher accident risk. The main biases are the frailty bias and the so-called low mileage bias (Hakamies-Blomqvist, 2003).

Frailty bias

In an accident of the same impact an older adult is much more likely to die or sustain severe injury than a younger adult (Evans, 2001). In other words, older adults are easily killed or seriously injured in accidents. This poses a problem as estimation of accident risk of various groups in the society is based on accident statistics which often stem from police recorded accidents. Not all accidents and incidents are reported to the police. The more serious an accident is the more likely it is that it will be reported to the police. As a consequence, a larger share of the older adults' accidents than of the younger adults' accidents are registered and thereby inflate the estimated accident risk of older drivers (Hakamies-Blomqvist, 1998). Li et al. (2003) estimate that 60 – 95 % of the increased accident risk for older drivers can be accounted for by the frailty bias.

Low mileage bias
People who drive less have, on a group level, more accidents per kilometres driven. This can partly be explained by lack of routine but also by their driving patterns where they gain their exposure. People, who drive long distances usually drive many of their kilometres on motorways. As motorways are the safest roads to drive on, this group consequently gains a lot of safe kilometres (that is, kilometres with much lower accident probability). People, who only drive little on the other hand, tend to drive more in urban areas and thus more complicated traffic situations where the probability for accidents is higher. Their gained exposure is therefore more risky to begin with, independent on the age of the driver (Hakamies-Blomqvist, 2003). Older drivers generally drive fewer kilometres than middle aged drivers, largely due to different activity patterns after retirement. When comparing older drivers and middle aged drivers with the same yearly mileage, the age difference in accident rates, illustrated in the U- shaped curve, disappears (Langford et al., 2006; Keall & Frith, 2006; Hakamies-Blomqvist et al., 2002; Fontaine, 2003). Thus, it is the quantitative and qualitative differences in driving exposure and not chronological age that explains the increase in accident risk illustrated in the U-shaped curve.

Defensive driving and responsibility in accident involvement
One approach in finding out whether older drivers are a high-risk group has been examining who is the responsible party in older driver accidents. It has been found, that older drivers are often the guilty part in the accidents they have. However, when examining this further it becomes clear that it in part can be explained by the older drivers having a defensive driving style. This means that they drive more careful and slowly and are therefore good at compensating for other road users mistakes and avoid accidents this way. However, when older drivers make mistakes, younger drivers are less likely to compensate for this, as they often do not have a defensive driving style, and the accident is therefore not avoided. Consequently when older drivers have accidents it is often when they have made a mistake and thus become the responsible party (Hakamies-Blomqvist, 1998; 2003; Langford & Koppel, 2006).

Age based population screening for fitness to drive does not produce any safety benefits
Age based population screening is still widely used, both inside and outside the EU, as a measure to improve road safety. This is despite the fact that evidence showing that chronological age, in the case of mature drivers, does not relate to accident risk, and the fact that studies that have evaluated the safety effects of population screening have all failed to document any safety benefits of this type of screening.

A study by Mitchell (2008) compared seven EU countries with different screening procedures. He found that the countries that had the most lenient screening procedures also had the lowest accident rates among older drivers. He concludes that one cannot find any safety benefit from compulsory medical screening of older drivers.

Rock (1998) compared accident rates, in the state of Illinois, before and after the license renewal rules were revised. For the 69 – 74 year old group the rules had become more lenient, by removing mandatory on-road test and for the older group aged 80+, the rules had become stricter, by requiring more frequent checks. These changes had neither a negative effect on the safety of the younger group nor a positive effect on the safety of the older group.

Another three American studies compared accident rates in different states with different age based license renewal policies. Grabowski et al. (2004) found that having to renew your license in person, as opposed to by mail, had some safety effect for the age group 85+. However, additional test such as vision tests and on-road tests did not produce any additional safety effects. Levy et al. (1995) found that including a visual acuity test was related to somewhat lower accident risk but the addition of a theoretical driving test did not have any effect. Finally, Lange & McKnight (1996) found that states with age based screening had more accidents among older drivers.

In Scandinavia, Hakamies-Blomqvist et al. (1996) compared accident rates in Sweden, where there is no aged based screening and Finland, where drivers, from the age of 70, are required to go through a medical check in order to renew their license. This study could not demonstrate any safety benefits of the screening procedure in Finland. On the contrary they found a higher rate of fatalities among unprotected road users aged 70+ in Finland. They interpreted this to be an indirect negative effect of the screening procedure by making older drivers change into less safe modes of transport such as cycling and walking.

In Australia the same pattern appears, Langford at al. (2004a) compared accident rates of older drivers in Melbourne (no screening) and Sidney (Screening from the age of 80) they failed to find any safety benefits for the older drivers living in Sidney. In addition, Langford et al. (2004b) compared the accident statistics of older drivers in six Australian states and found that the accident rates were lowest in the state of Victoria which is the only state without aged based screening. More recently Langford et al. (2008) examined whether older driver screening procedures had any safety benefits not only for the older drivers themselves but also for the accident rates of other road users. They conclude that screening procedures do not have any safety benefits either for the older drivers themselves or other road users.

Recently, Siren & Meng (2010) evaluated how upgrading the Danish screening procedure in 2006 by adding a cognitive screening test to the medical check in connection to the licence renewal affected safety. Like the previous studies, also this study failed to find any safety benefits of the screening and, as in the study by Hakamies-Blomqvist et al. (1996), the results indicated that the screening may have an indirect negative effect on the overall traffic safety of older adults.

All in all, the research in this area suggests that screening does not produce the desired safety benefits – quite the contrary it seems to have an indirect negative effect on the overall road safety.

Why do age based population screening fail to produce any safety benefits?
There are several possible explanations for this among other, it is not possible to estimate a person's individual risk, accidents at the individual level are very rare, and screening may make other sub-groups than the one originally targeted stop driving.

Individual risk cannot be estimated
Ideally only drivers who would be involved in accidents, if allowed to drive, should have their drivers license revoked. In order to achieve this, the person's individual risk has to be estimated with sufficient accuracy. However, assessing "individual risk" is conceptually impossible (Hakamies-Blomqvist, 2006). For example, if a person suffers from problems with attention, in order for an accident to occur he or she has to end up in a traffic situation that is too demanding for

him or her. At the same time other road users have to fail to compensate for the inappropriate behaviour. Then the technical aspects of the road environment will also influence the likelihood of an accident occurring as will the weather condition at this moment of time. All these factors cannot, for good reasons, be predicted in a testing situation. Therefore you cannot estimate a person's individual risk. At best you can assign a person to a group having a certain level of estimated risk which is based on statistical information about the accident involvement of this group.

Accidents at the individual level are very rare
Even if an individual driver could be labelled as belonging to a high risk group, we should remember that most at-risk drivers never have accidents. If a person with for example dementia has twice as high a risk of having an accident as a healthy person of the same age, the likelihood of him or her actually having an accident is still very small. Hakamies-Blomqvist (2003) has illustrated this with the following example: If a healthy person's risk of having an accident is one in every 20 000 persons meaning that for every 20 000 persons one of these will have an accident. If a person then has twice the risk, 1 in 10 000 would have an accident. However, as it is unknown which one of these 10 000 persons will be having an accident all 10 000 persons must be removed from the roads in order to avoid 1 accident. Another concern in this matter is that 9 999 persons would, in the above example, have lost their option to drive for no reason as they would never have had an accident anyway. For many people this equates losing their independent mobility as they have no suitable alternative to driving (OECD, 2001).

Screening also makes safe drivers stop driving
There are also other factors than driving ability that influence whether an individual will renew his or her drivers' license. They include whether there are other drivers in the household and how confident the person is as a driver, for example. Studies have shown that for example women, who are still fit to drive, often choose not to renew their drivers licence when screening is required (Siren et al., 2004; Stutts & Wilkins, 2003; Wilkins et al., 1999; Hakamies-Blomqvist & Wahlström, 1998). By making these drivers choose more risky modes of transportation the overall traffic safety becomes worse.

Conclusion
In conclusion

- Older drivers generally do not have an increased accident risk.
- All studies that have evaluated the safety effects of age based population screening for fitness to drive have failed to document any safety benefits from this type of screening.
- On the contrary studies indicate that this type of screening may have an indirect negative effect on the overall traffic safety.

This seriously questions the rationale of having this kind of screening used as a safety measure.

Another aspect is mobility. Screening tends to take drivers, who would never have ended in an accident anyway, off the roads. These people potentially lose their independent mobility for no reason. This is a serious issue as mobility has been linked to quality of life (Farquar, 1995) and psychological health (Marottoli et al., 1997).

Also, independent mobility makes it possible to live a social and physical active life which again is a prerequisite for maintaining the functional level of older adults (Avlund et al., 2004; Mack et al., 1997). Loss of mobility therefore brings on costs for the society in the form of increased need for health care and support in daily living.

Consequently there is reason to believe that age based population screening is not only ethically questionable, but actually have greater economic costs than benefits for society, particularly when the proportion of the older population is increasing.

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