

Master thesis title: Effect of Social Pressure on Driving Ability of Older Drivers

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Introduction

The research on influence of social pressure on driving ability of older drivers was initiated due to several reasons.

First, this is the population ageing and corresponding growth of older drivers. However, it is not only the question of their number, but also the fact that elderly continue to drive for longer time than before. Why is this important? The major reason is the impact on traffic safety:

- *High fatality rates.* Older people tend to drive less, but still they are more likely to become a victim of an accident. Age-related declinations of health and physical conditions lead to higher fragility, therefore any injury can become fatal for them.
- *High crash rate in complex road conditions.* Older drivers also prefer to drive in close familiar areas using urban or rural roads, and making less use of highways. As the accident probability is always lower on the highway, driving more on the smaller roads becomes more risky for any driver. Urban and rural roads are also more complex and require good level of physical and cognitive skills. Deterioration of these skills, and therefore poorer ability to response to difficulties on the road leads to higher level of stress and errors. This makes complex road environments the major reason for the accidents involving older drivers.

Second, it is an increasing tendency for tailgating. This type of social pressure on the road contributes to the growth of traffic complexity. By inducing higher stress levels, it increases driver's workload and leads to errors and mistakes. It is also a contributing factor to rear-end and fatal crashes.

Finally, there is a lack of comprehensive scientific researches that investigate these types of problems. Taking into account everything mentioned above, drivers' population

ageing and social pressure on the road are two fast emerging issues, better understanding of which might contribute to improvements in traffic safety in near future.

Research questions and hypothesis

The research questions for this study are formulated as following:

- What is the effect of social pressure on driving performance of older drivers?
- Is there a relation between subjective and objective effect of social pressure on driving performance of older drivers?

The study also hypothesized that an increase of driver's age leads to poor response to social pressure during driving.

Method

Participants. The experiment started with 143 volunteers; 92 of them completed the experiment, others quitted due to the simulator sickness. Age ranged from 63 till 90 years, with mean of 72,51 (SD=5,76). All of them were active drivers in a good health state, not stroke during last six months and not cognitively impaired: MMSE score of 25 and higher, with mean of 28,73 (SD=1,21).

Tools. The main tool for the experiment was the driving simulator of the Transportation Research Institute, University of Hasselt. Cognitive measures were evaluated based on MMSE and NASA TLX questionnaire.

Tasks. Driving scenario was divided in two tasks: without and with tailgater. Total distance was 6,6 km of the urban road. Tailgaters changed every 1000 m, when there was no event; they also reproduced driver's deviations to the sides. Rapid braking or stop caused rear-end crash. Six driving measures were investigated: crash number, complete stop at the stop sign, driving speed, gap acceptance, priority giving and standard deviation of lateral position.

Results

Three out of six driving measures are influenced by age, social pressure or combination of these two. For the driving speed, there is a significant effect of scenario. Speed variations depend on the presence of tailgater (mean=41,4 km/h and 42,535 km/h without and with tailgater correspondingly). Effect size of Cohen's $d=1,8$. For the priority giving, there is a significant effect of age (Pearson $r=-0,303$, $p=0,003$), indicating negative linear relationships. For crash number, there is a significant interaction between scenario and age. Here, two age groups age formed based on median=71,5 years: "young-old" $\leq 71,5$ and "older-old" $>71,5$. For an effect of scenario and age, a number of crashes is higher for an "older-old" group at the presence of tailgater. Subjectively, respondents evaluated their driving with high scores, indicating clear overestimation of performance.

Conclusion

The results of the research revealed important behavioural changes of driving performance of elderly under the influence of social pressure on the road. Therefore, **social pressure has an impact on the driving ability** of older drivers. Together with age-related health declinations, social pressure affects decision-making process of older drivers and lead to larger number of errors and mistakes.

Implications. The major implication of the research results relates to the traffic safety. Social pressure acting as additional stressor might provoke increase of crashes or their severity. The increase of crash numbers due to the presence of social pressure together with high fragility might lead to corresponding increase of fatalities. This is an emerging problem that has to be addressed in a short term with the help of:

- Education programs and trainings for older drivers can incorporate ways of coping with stress and social pressure on the road to ensure personal safety;
- Education programs for younger drivers (and driving licence training) might pay more attention to the aggressive driving and its danger;
- Implementation of aggressive driving enforcement;
- Road infrastructure attributes can be developed in order to address safety problem of older drivers.