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Risk Profiles of Elderly Drivers with Accidents – Implications for Intervention and Policy

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Introduction

Increasing life expectancy as well as a low birth rates lead to ageing of the society in general. Yet nowadays, remarkable effects of this development have occurred which even will be reinforced during the next decades. Changes in mobility patterns are related , and the number of senior drivers rises. More and more elderly people prefer life-styles and leisure stamped by activity and societal participation. By serving the aim of keeping mobility and independency in life, cars play an important role in this context. However, onward with age, different losses in physical and mental capacity can affect the performance of the driver. Thus, the issue of risk to experience an accident has turned to a matter of key interest. But research findings concerning accident risks of elderly drivers have been quite inconsistent.

Granted by the German Federal Highway Research Institute, the Centre for the Cultures of Ageing at the University of Bonn therefore launched a study to investigate the influence of age-related losses on accident risk in a more differentiated way. It was intended to identify separate groups of elderly drivers who experienced accidents and to describe specific psychological and health-related patterns of these groups. Based on these patterns, differentiated recommendations for intervention are possible, taking into account that elderly drivers are in fact a very heterogeneous group with specific needs.

Theoretical and Empirical Background

Recent literature clearly shows an increase of the need for mobility and the importance of ensuring it by driving a car. The issue of risk potentials of elderly drivers is discussed quite controversial. There is evidence for a kilometrage related risk and a disproportionally high fault for accidents on the one hand. On the other hand, vulnerability and mortality of elderly drivers are increased. Analyses of accident statistics in the area of the city of Bonn (2000-2005)indicate that senior drivers are entangled in accidents less than theoretically expected, but do cause an accident above average. Due to the avoidance of complex driving situations, they are rarely involved in accidents happening under extreme temperature, on bad roads, on weekends, and after nightfall. Also less often, accidents happen at side roads, turns,

grades or slopes. However, elderly drivers tend to violate traffic rules more often and show inadequate behaviour against pedestrians.

But, there is no empirical evidence neither for a universal nor for a general decline of driving capacities in age. So, the global deficit model of a senior driver has to be rejected and more attention to be paid to a more optimistic view on the potentials of elderly people in motor traffic. Though a decline of cognitive capacity in specific areas cannot be denied, these deficits do not lead automatically to negative effects on driving performance. Mechanisms of compensation can outweigh deficits related to traffic in principle. Whether compensation mechanisms are used or not, depends again on the drivers personality properties. Overall, the estimation of accidental risk with respect to elderly who participate in motor traffic requires a holistic approach. This approach should incorporate the impairment of individual performance as well as compensation potentials and significant factors of personality.

Method

A sample of n=180 senior drivers from Greater Bonn was recruited. These drivers with a minimum age of 65 years have had one ore more accidents during the last five years before investigation. Thanks to a cooperation with the Police Department of Greater Bonn, the complete accident data base of the police served as source of sampling. Potential participants (N > 2500) were first contacted by the police. If interested, they could further make contact with the Centre for the Cultures of Ageing in order to step into the study. Core of investigation was a face-to-face interview of 1,5 hours to take place at the participant's home. The interview covered the following topics: driving biography, driving motivation, strategies of compensation, self-image as a driver, health in traffic, subjective health, diseases and disorders, perception of risks, errors in driving, mistakes in driving behaviour, history of accident(s).

Moreover, a subsample of 50 subjects took part in an extensive medical and psychological assessment, computer-aided testing (e.g. of alertness), and a standardized real-life driving task. This assessment lead to more objective information about the health status of the probands. A special interest focused on diseases and the consumption of pharmaceuticals with expected effects on driving ability. The cooperation with an expert in traffic-related medical issues provided us with general judgement on fitness for driving.

Computer-aided testing served as a check of psychological functions associated with driving. In this context, the "Test Battery for Alertness" (TAP; Zimmermann & Fimm, 1993) was applicated. It is an instrument for to examine resilience, orientation, concentration, alertness, and reaction capacity of the probands. In Germany, the TAP is generally recommended for the testing of driving ability.

A standardized driving task delivered information about real-live driving behaviour and driving ability in well-defined situations. Subjects had to drive 45 minutes in city traffic, overland

roads, and on the motorway. Driving behaviour was recorded by a trained observer who rated, if a specific behaviour had been shown correct, false or not observable. The driving task was conducted by a professional driving instructor. In the end of the task, both observer and driving instructor judged the general driving ability as well as several details of driving behaviour.

Data analysis covered both univariate and multivariate statistical standard procedures. In order to identify structures of seperatable risk groups of elderly drivers, cluster analysis was applicated.

Results and Discussion

The results of descriptive analyses add to recent accident research on mobility in the elderly. The current generation of seniors seems to be a very active one, which uses the car intensively and appreciates its convenience as well as its contribution to personal autonomy. An average kilometrage of 10.000 km per year bears evidence of a frequent driving generation, which uses the car not only for necessary purposes, but very often for leisure and traveling. Seniors deal thoroughly with their future perspective of driving and express the hope for driving as long as health problems do not prevent them from doing so. At time, the majority avoids driving at night, with high speed and over long distances without having a break.

Both concerning their own driving ability and with respect to their own health, seniors show high self-confidence. Interindividual comparison with persons of the same age indicates a trend to overestimation: only 0,6 percent of the elderly evaluate their health status worse (driving ability: 0,7 percent) in comparison with the group of same age. The trend is supported by analyses of self-evaluation with respect to objective performance indicators: 80,9 percent judge their driving performance better than objective measurement would justify.

Data on diseases and the use of pharmaceuticals underline the high importance of multimorbidity. 76,7 percent of subjects suffer from more than one disease while 61,8 percent use more than one pharmaceutical. And 11,1 percent use pharmaceuticals which damage the capability of driving in a severe way. For sure, this result cannot be generalized for the population of 65+ drivers, because the sample represents an accident group. And an accident is, especially in age, a statistically quite rare event. Therefore, the sample represents a highly selective risk group, from which results cannot be assigned in an equal percent relation. However is it quite remarkable that every tenth uses pharmaceuticals which should exclude the participation in motor traffic. There seems to exist a gap of information to be closed in future for instance by general medical practitioners.

With respect to the accident(s) as a reason for recruitment, 60 percent of culprits report a special obstacle (traffic situation not foreseen, mistakes of other traffic participants, weather conditions etc.) as main reason for the accident. However, nearly all participants reported to be familiar with the road where the accident happened, which indicates that the obstacle

had been really unexpected. Apparently, seniors have problems in adjustment of behaviour spontaneously to unexpected or complex situations. This supports the hypothesis of Falkenstein & Sommer (2008) who suppose that difficulties occur in surprising situations which require a quick strategic adjustment of driving related motor functions.

Within further analyses, comparisons with an accident-free sample of a study conducted previously (AEMEIS, 2000) were made. Hereby, several differences showed up. Subjects of the accident-sample got their driving license significantly earlier, have a lower perception of risks and a better self-image. They visit the doctor more frequently and have more likely ophtalmological diseases. One the one hand, this could be explained by a cohort effect, regarding the sample of our study as a particularly active, self-confident and health oriented generation. On the other hand, differences could be traced back to the group differentiating attribute of accident entangling. In this case, higher kilometrage, lower risk perception, overestimated self-image and higher extent of ophtalmological diseases would serve as a risk fostering component with respect to road safety.

The impact of diseases on risks was the topic of the comparison with another accident-free sample (FRAME, 2003). It could be shown that drivers within our recent study had significantly more diseases than those within the FRAME sample. The interpretation in the sense of a higher risk to be entangled in an accident is supported by findings of Holte & Albrecht (2004), who argue that multimorbid persons bear a higher risk to have an accident than healthy people. By parallelization of age groups we could show that there is no effect of chronological age on this finding.

Research on accidents often emphasizes the importance to compare culprits with non-culprits. This should enable a differentiated investigation of attributes which could possibly explain a culprit status. In our analyses, considerable risk modulating variables did not have a conjoint value of explanation. Neither was it possible to predict the culprit status nor could be any significant group differences identified. In conclusion, the culprit issue on its own does not seem to be a sufficient attribute to explain risk modulating variation or to serve as a group differentiating variable with respect to different risk rates. At this point, the structure discovering method of cluster analysis was incorporated.

In fact, clustering risk modulating variables of driving behaviour showed that culprits appear to be a very heterogeneous group, which variability hides by regarding it on its own. In our analysis, three clusters could be distinguished:

CLUSTER 1: few culpable accidents over the life span, medium kilometrage per year, low burden with diseases, low consumption of pharmaceuticals, unspicious objective driving performance indicators.

CLUSTER 2: comparably low age, high kilometrage per year, many culpable accidents, low awareness of driving ability problems, high readiness for wrong behaviour in traffic, low bur-

den with diseases, low consumption of pharmaceuticals, unspicious objective driving performance indicators.

CLUSTER 3: comparably high age, many culpable accidents, low kilometrage per year, high awareness of driving ability problems, high burden with diseases, high consumption of pharmaceuticals, distinctive compensatory behaviour, objective driving performance indicators below average.

With respect to culpability, cluster analysis leads to two groups of culprits (comparably high vs. comparably low age) and one group of non-culprits, where all ages (65-87 years) are represented. The latter does not seem to be neither a risk for road safety nor a target group for intervention. Remarkably, this group (Cluster 1) covers about 50 percent of the sample. Moreover, this result underlines the impression that chronological age on its own is not a reliable predictor for performance deficits in driving.

Cluster 2 covers the comparably younger culprits and represents about 25 percent of the sample. This group shows the highest entangling in accidents and the highest amount of mistakes in driving behaviour. The group can be characterized by high readiness for risky behaviour and a lack of self-reflection about driving problems. From the point of objective capability, there seems to be no reason for being highly entangled in accidents. However, there is a lack of intrinsic motivation to develop a safety-conscious attitude, problem consciousness, and critical self-reflection. This group of drivers should be a main target group of intervention. Thus, road safety action could convey systematically a change of attitudes and a more defensive style of driving.

The comparably elder culprits (Cluster 3, 25 percent of the sample) show the highest burden with diseases and consume more pharmaceuticals than the other groups. They know well about their lack of driving ability and fear an obligatory medical examination of driving abilities much more than the other groups. Different to cluster 2, this group has a severe problem with objective performance in driving, which hardly can be solved by mechanisms of compensation. Based on this, intervention should address actual performance behaviour in the first place. Practically, this could be reached by consulting about possibilities of selection (e.g. reduction of trips), compensation (e.g. technical aid), and optimization (specific concepts of drivers training). Besides, the role of the family doctor in consulting these group might have a special importance.

To sum up, generizability of our findings remains an issue of discussion. Further research, especially by longitudinal designs, is needed. By this, characteristics and extension of the groups should be described with a higher resolution. Beyond, the effects of group specific strategies of intervention should be evaluated.

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