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Cohort effects in older drivers' accident type distribution: are older drivers as old as they used to be?

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Abstract

Accident type distributions were compared in successive cohorts of older drivers, with focus on intersection accidents. It was thought that if the increasing share of intersection accidents is a truly age-related phenomenon, as opposed to cohort-related or time-related, it would remain fairly constant over time in different cohorts. The data consisted of Finnish traffic insurance data on private car accidents of drivers aged 60 yr or more who were legally responsible for causing the accident, and covered the years 1987–1995 ($N = 56,481$). Some changes in accident type distributions were found across cohorts. Among male drivers aged 60–79 yr, the portion of intersection accidents decreased in successive cohorts, so that the younger cohorts showed the age-typical accident picture at a somewhat later age than the older cohorts. In contrast, for male drivers aged 80 yr or more, there was an increase in the share of intersection accidents in more recent cohorts. Among female drivers, a decrease in intersection accidents only reached statistical significance for drivers aged 60–69 yr, and for the oldest age group (75+ yr) no change was observed. For both male and female drivers, the tendency to incur accidents at intersections increased with age in all cohorts. The occurrence of intersection accidents thus is both an age-related and a cohort-related phenomenon: age-related in the sense that it will emerge eventually, but with cohort-related variance in timing. © 2000 Published by Elsevier Science Ltd. All rights reserved.

Keywords: Older driver; Accident; Cohort

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1. Introduction

The proportion of older drivers in the driver population increases in the industrialized world as a consequence of the aging of populations, and of increasing licensing rates in successive cohorts of older citizens. Research efforts have been dedicated to describe and understand the accident epidemiology of older drivers (for a review, see Eberhard, 1996; Hakamies-Blomqvist, 1996). The generalizability of the accumulated findings can be questioned, however. Private car use is a relatively recent phenomenon. During the active driving career of the present older drivers, the task environment has undergone profound changes. The traffic environment and culture, including the design of cars, roads, and rule systems, and the rhythm of road traffic, are all very different to what they were in the beginning of the present older drivers' learning history. Hence, their specific experience pattern may produce outcomes that will not be repeated among future cohorts who most probably will have a more homogeneous learning history. In addition, while the present older drivers are a select group and have mostly learned to drive as adults, in future cohorts of older citizens the majority will be license holders and they will have started driving at an earlier age. Hence, when findings about older drivers' accident epidemiology are presented, it is difficult to say which aspects, if any, are truly age-related, and which ones merely cohort-specific phenomena.

A few studies have addressed the question of accident rates among different cohorts of older drivers. Evans concluded that the severity of the "older driver problem" was exaggerated because it was largely based on studies confounding age and cohort effects (Evans, 1993). Similarly, Stamatiadis (1995) found that cohorts of older drivers born later had smaller risks than cohorts born earlier. Comparing older drivers' representation in the licensed driver population to age-related crash trends, Stutts showed that crash rates did not increase in keeping with the increasing proportion of older drivers; this was especially true for females and nonwhite drivers (Stutts & Martell, 1992). All these studies used data from the US. While these combined findings strongly suggest that the accident rates of older drivers have been decreasing in successive cohorts, little or nothing is known about possible cohort effects in the kind of accidents older drivers have. Yet, there are certain fairly constant traits in older drivers' accident epidemiology, as described in cross-sectional research, which in principle make it possible to analyze not only accident rates but also accident characteristics.

Arguably the most consistent finding regarding older drivers' accident types is that older drivers tend to have with age increasing portions of their accidents in intersections and in other complex situations (Cooper, 1990; Hakamies-Blomqvist, 1993; Hakamies-Blomqvist, 1994a). Correspondingly, the proportion of other types of accidents decreases. Thus, an overrepresentation of accidents in intersection can reasonably be considered an older-driver-like characteristic. In the present study we compared the accident type distributions of successive cohorts of older drivers, with focus on intersection accidents. It was thought that if the increasing share of intersection accidents is a truly age-related phenomenon, as opposed to cohort-related or time-related (for a methodological discussion, see Nesselroade & Labouvie, 1985), it would remain fairly constant over time in different cohorts. We use the expression "age-related" in a broad sense covering any relevant factors covarying with chronological age, i.e., both the effects of normal aging and the effects of, e.g., illnesses with age-related increase in prevalence.

2. Materials and methods

The basic data consist of all traffic accidents occurring in Finland in the years 1973–1995, and leading to claims on insurance policies accepted by the insurance companies, excluding cases where the age of the driver was under 18 or unknown ($N=1,641,411$). According to earlier studies, these insurance data cover approximately 78% of all traffic accidents and about 86% of all injury accidents. Underrepresented are mainly single-vehicle accidents that do not lead to personal injury. The data are recorded per insured vehicle of the paying, i.e., legally responsible party. Thus, all data about drivers presented below are data about drivers at fault, exclusively. In the .5% of cases with shared legal responsibility, the same accident appears more than once in the database.

For the purposes of the present study, only data on private car drivers aged 60 yr or more were included, excluding cases with missing gender information. Since the aim of the study was to follow up in time the accident type distributions of different older driver cohorts, it was imperative that the data be coded in a consistent manner during the period covered by the analysis. However, a more detailed coding system had been introduced in 1987, and codes in the data before and after 1987 could not be reliably matched. Hence, the analysis was limited to the years 1987–1995. The final number of accident-involved drivers included in the study thus was 56,481, divided into age and gender groups as shown in Table 1.

The present analysis focused on changes between cohorts in the proportion of intersection accidents. To determine whether the changes were statistically significant, the slope coefficients of regression lines fitted to the observed data were compared to zero (i.e., no change); alpha was set at .05. All changes reported in Section 3 were statistically significant, if nothing else is specified in the text.

Table 1
Number of accident-involved drivers according to year of accident, age, and gender

Year of accident	Male-age group				Total M	Female-age group			Total F	M+F
	60–69	70–74	75–79	80+		60–69	70–74	75+		
87	3230	877	568	317	4992	496	82	72	650	5642
88	3289	942	557	415	5203	592	101	110	803	6006
89	3287	827	639	355	5108	594	126	106	826	5934
90	3379	954	677	298	5308	655	132	71	858	6166
91	3306	984	686	337	5313	729	154	99	982	6295
92	3350	1061	697	370	5478	682	139	116	937	6415
93	3099	1041	676	421	5237	694	204	146	1044	6281
94	3334	1128	694	501	5657	846	171	133	1150	6807
95	3176	1207	766	568	5717	835	239	144	1218	6935
Total	29,450	9021	5960	3582	48,013	6123	1348	997	8468	56,481

3. Results

In the following figures, in case of collisions between vehicles, the accidents were classified according to the relative driving directions of the colliding vehicles. The three categories of collisions thus were “same driving directions”, “opposing driving directions”, and “crossing driving directions”. The other categories of accidents used in the present analysis were “hitting a pedestrian”, “single-vehicle accident”, and “other”.

3.1. Male drivers

As shown in Fig. 1, those accident-involved male drivers who were between 60 and 69 yr of age in 1987 had a larger share of their accidents in intersections than those being in the same age range in 1995. From 1987 to 1995 the proportion of intersection accidents went down from 35% to 30%.

A similar trend was observed for male driver cohorts aged 70–74 yr (Fig. 2) and 75–79 yr (Fig. 3). While the share of intersections accidents of all accidents increased with age, it decreased

Fig. 1. Accident type distribution in successive cohorts of male drivers aged 60–69 yr.

Fig. 2. Accident type distribution in successive cohorts of male drivers aged 70–74 yr.

Fig. 3. Accident type distribution in successive cohorts of male drivers aged 75–79 yr.

in successive cohorts, so that the more recent cohorts had a less “older-driver-like” accident type distribution.

For the oldest male drivers, the cohort comparison showed a different trend (Fig. 4). In the age group 80+, the more recent the cohort, the higher was the proportion of intersection accidents among their accidents.

3.2. Female drivers

For female drivers aged 60–69 yr, the proportion of intersection accidents decreased in successive cohorts (Fig. 5). In the age group 70–74 yr, a similar trend did not reach statistical significance (Fig. 6).

In the oldest age group of female drivers (75+), the absolute numbers of accidents were so small that possible trends could be blurred by random noise; however, the distribution of accident types appeared stable across the different cohorts (Fig. 7).

Fig. 4. Accident type distribution in successive cohorts of male drivers aged 80 yr or more.

Fig. 5. Accident type distribution in successive cohorts of female drivers aged 60–69 yr.

Fig. 6. Accident type distribution in successive cohorts of male drivers aged 70–74 yr.

4. Discussion

In the present study, certain changes in accident type distributions were found across cohorts. Among male drivers aged 60–79, the proportion of intersection accidents decreased in successive cohorts, so that the younger cohorts showed the older-driver-like accident picture at a somewhat later age than the older cohorts. On the other hand, for male drivers aged 80 yr or more, there was an increase of the share of intersection accidents in the more recent cohorts. Among female drivers, a decrease in intersection accidents only reached statistical significance for drivers aged 60–69 yr. For the oldest age group, 75+ yr, no change was observed.

The decrease in intersection accidents among younger cohorts as compared to older ones seems to indicate that the more recent cohorts indeed do “age later” as drivers; in other words, they acquire the typical accident type distribution at a higher age than their predecessors. This finding is in harmony with earlier findings showing that more recent cohorts have smaller accident risk than more distant ones (Evans, 1993; Stamatiadis, 1995; Stutts & Martell, 1992). Whatever the reasons hereof, it shows that the dominance of intersection accidents is both an age-related and a cohort-related phenomenon: age-related in the sense that it will emerge eventually, but with

Fig. 7. Accident type distribution in successive cohorts of female drivers aged 75 yr or more.

cohort-related variance in timing. As to the third parameter, that of time, it seems plausible there have been changes in the traffic environment between 1987 and 1994 that may have improved the safety of intersections. However, since the direction of the observed changes was not the same in all cohorts, improvements in the environment cannot be the sole explanation of the present findings.

The finding that the oldest drivers of the more recent cohorts have increasing portions of intersection accidents does not have any straightforward interpretation. It does not seem plausible that the drivers aged 80+ in the more recent cohorts would be less fit or less experienced than those in the earlier cohorts. However, since in every successive cohort, license holding and active driving becomes more common (Barr, 1991) it is safe to assume that the earlier cohorts of drivers aged 80+ were more select subpopulations of their cohorts than the more recent ones. When driving up to a high age becomes common, variance in health- and performance-related variables within the group of the oldest drivers increases (Hakamies-Blomqvist, 1998). The current and future oldest drivers will be an increasingly representative sample of their age group in the general population, probably including a larger proportion of drivers with risk-increasing functional deficits. It is also possible that the driving habits of the oldest drivers have changed. However, with no additional information accessible, these attempts to explain the finding remain somewhat speculative.

While the present findings showed some differences between the different cohorts, the tendency to incur accidents in intersections increased with age in all cohorts. This does not mean, however, that it would be due to age per se; rather, it covaries with age as do a number of other things, including prevalence of different risk-increasing health conditions and functional deficits. Intersection driving is a complex, forced-paced task during which several subtasks have to be performed within a limited amount of time defined by a combination of physical layout and speed limits of the intersection, which places a heavy momentary load on the driver (Hakamies-Blomqvist, 1996). In such a task, many age- or illness-related functional deficits may affect the level of performance negatively and increase the probability of mistakes. Because of the nature of the task, the usual compensatory mechanism (Cooper, Tallman, Tuokko & Beattle, 1993; Hakamies-Blomqvist, 1994b) of winning more time by choosing to operate on lower speeds is not applicable.

To conclude, future cohorts of older drivers will grow old as drivers at a somewhat later age than the present ones. The typical accident patterns of increasing rates of serious accidents and increasing shares of accidents in intersections will, however, eventually emerge. For the oldest drivers, the safety trend may even be worsening when larger percentages of license holders in the oldest age groups continue driving. Hence, both research efforts and safety measures focusing on the needs and problems of the aging drivers will be needed.

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