Age and Fatal Motor Vehicle Accidents

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A 2-year study (1955-56) of fatal traffic accidents recorded whether the fatality was a driver, a passenger, or a pedestrian. Separate plots of 5-year age groups from 0 to 85 and over were made by sex. The first year male fatalities comprised 285 drivers, 114 passengers, and 36 pedestrians; the second year, 315 drivers, 124 passengers, and 56 pedestrians. The same year, female fatalities comprised 48 drivers, 140 passengers, and 14 pedestrians.

Driver fatalities showed almost a 9-to-1 ratio of male to female for 1955 and about a 6-to-1 ratio in 1956. A table of expectancies was set up showing approximately 73.45 percent male and 26.56 percent female driver licensees for those years. Ages 15 and above were used in making calculations on drivers.

Further figures are given on the percentage of total licensed drivers by 10-year age groups as an estimate for the United States. These estimates are for use in figuring expectancies by age groups.

An analysis is made for the 2-year period by age and sex with an indication of relative proportions at each age level, as well as for the two sexes combined.

Estimates of driver fatalities per 100 million miles of vehicular travel are graphed by 5-year age groups for the two sexes. The over-all results show almost twice as many driver fatalities per 100 million vehicle miles of travel for men as for women. At only two points do the curves overlap—ages 25-29 and 60-64. The data indicate no need for frequent reexamination of drivers throughout the middle age groups.

● MANY STATISTICS have been released on the frequency of accidents among persons, but relatively few have taken into account the frequencies or size of the groups involved. When age groups of drivers or motorists are compared there are always larger percentages at one age level than another. The purpose of this study is to analyze the relationships of drivers, considering the numbers and the mileage driven, and to study the likelihood of fatal driver accidents at different age levels. When pedestrians, passengers, and drivers are all lumped together it is difficult to see the true picture from any summary given in lump terms.

This problem seems important in light of the fact that there is considerable attention being given to the driver's license in relation to a change and need for reexaminations. Some states have set up a licensing schedule to reexamine every driver every two years. This is laudable, but it imposes an enormous expense which may not be warranted. As one drives after obtaining a license he gradually becomes better for several years, with the exception of a few persons whose records get worse. The latter is true of men and women lumped together, but when all factors are considered seems to be mostly true of men alone. Thus it might be possible to find a point where licensing examinations might be carried on less frequently because of less need for examination when changes are least likely to occur. Because men drive considerably more miles than women, the problem of mileage must be taken into account. Younger men drive more miles than older men. Consequently, all of these factors have to be weighed into some kind of an evaluation system whereby they may be equalized and the results given would be more meaningful than those generally used.

It has appeared repeatedly that the sexes need to be separated in studies of driving. What applies to males does not apply to females, and vice versa. Therefore, any study which does not separate the sexes is not very useful from a practical point of view in evaluating the performance of each sex at different age levels.

In 1956 Schwenk (1) reported a study which dealt only with fatal accidents in Iowa for 1955. She tabulated all fatalities according to whether the person was a driver, a passenger, or a pedestrian. In 1957 a similar study was worked out for 1956 fatalities in Iowa. Inasmuch as the percentages of drivers and the populations could be estimated, it was though advisable to determine whether distributions were according to chance.

Swanson, working with the National Safety Council figures, had shown that pedestrian fatalities are much more frequent than chance would indicate in the older groups. Although no figures are available on the total number of pedestrians as compared with drivers and passengers, at least account can be taken of the number who are killed and some proportions were worked out on this basis. Swanson's finding would then support the need for a more careful study of the frequency of accidents at different age levels, particularly with respect to the frequency of accidents among drivers, which is the fundamental problem of this study.

Using Schwenk's data and by a method of ranking the differences in expected deaths for the two-year period in Iowa, and calculating the reliability coefficient, it was found that the consistency was around 0.86. This is considering a segment of the population, such as Iowa, having about 1,500,000 drivers. It seems to indicate a fairly consistent result as obtained from year to year in the accident figures. In other words, one does not get a high figure in an age group one year and a low figure the next year in a population of this size: The figure would be sufficiently stable for any ordinary use in prognosticating the results or for making use of figures obtained for estimating from one year to the next.

METHOD AND PROCEDURE

As already suggested, the method consisted of using available data to determine the distribution of accidents by age groups and by sex, as well as by classification as to driver, pedestrian, or passenger. Although no one knows exactly how many passengers there are, it is possible to figure the percentage of licensees and to get some kind of

TABLE 1

DRIVER FATALITIES, BY SEX AND AGE GROUP

Age	1955			1956		
	Male	Female	Total	Male	Female	Total
15-19	38	1	39	45	7	52
20-24	51	4	55	54	3	57
25-29	29	5	34	39	11	50
30-34	17	3	20	19	3	22
35-39	28	2	30	27	2	29
40-44	25	4	29	24	4	28
45-49	13	2	15	21	5	26
50-54	15	1	16	18	5	23
55-59	17	4	21	17	2	19
60-64	14	3	17	17	4	21
65-69	16	0	16	8	1	9
70-74	11	3	14	10	1	11
75-79	8	0	8	10	0	10
80-84	3	0	3	5	0	5
85-over	0	0	0	1	0	1
Total	285	32	317	315	48	363

an estimate on the number for comparative purposes by the use of census figures. It is possible to get an estimate of the amount of driving done at the different age levels which can be worked into an evaluation plan. By calculating these probabilities and working out to a final index, a graph could be constructed which indicates more or less the likelihood of a driver getting into an accident, or at least the rates of frequencies at which drivers of the two sexes get into accidents at different age levels. The first distribution plotted by Schwenk is shown in Table 1 for drivers, both male and female.

TABLE 2

SUMMARY OF ALL FATALITIES IN IOWA, BY AGE GROUP

Age	Male			Female		
	Driver	Passenger	Pedestrian	Driver	Passenger	Pedestrian
			(a) 1955			
0-4	0	10	7	0	13	2
5-9	0	5	9	0	4	6
10-14	1	9	3	0	5	2
15-19	37	17	0	1	18	1
20-24	51	13	0	4	10	1
25-29	29	7	0	5	10	0
30-34	17	5	1	3	6	0
35-39	28	9	0	2	4	0
40-44	25	5	0	4	8	0
45-49	13	4	0	2	2	1
50-54	15	6	0	1	3	1
55-59	17	14	2	4	8	0
60-64	14	6	3	3	5	1
65-69	16	6	1	0	10	2
70-74	11	2	4	3	10	2
75-79	8	3	0	0	1	1
80-84	3	2	4	0	1	0
85-over	0	1	2	0	1	0
Total	285	114	36	32	119	20
			(b) 1956			
0-4	0	10	6	0	9	1
0-9	2	7	9	0	7	4
10-14	2	7	6	1	5	1
15-19	41	34	0	6	24	0
20-24	54	13	3	3	8	0
25-29	36	6	1	11	8	0
30-34	19	3	1	3	7	0
35-39	27	6	1	2	12	0
40-44	24	5	1	4	6	0
45-49	21	4	1	5	7	0
50-54	18	6	1	5	8	2
55-59	17	7	3	2	4	1
60-64	17	3	5	4	9	1
65-69	8	5	4	1	8	3
70-74	10	3	7	1	8	0
75-79	10	4	3	0	3	1
80-84	5	0	3	0	6	0
85-over	1	1	1	0	1	0
Total	315	124	56	48	140	14

This is for a two-year period (1955 and 1956). These are the data used by Swanson for calculating an estimate of reliability.

It will be noted that the number of male drivers is high in proportion to the number of female drivers for both years and at practically all age levels. Only ages 15 and above were used because drivers are not supposed to be licensed below age 15. Although a few may drive, it is shown that a very small percentage of licensees is 14 years and under.

Table 2 includes the data of Table 1 plus the number of passenger and pedestrian fatalities. It will be noted that a large percentage of fatalities in Iowa for these two years consisted of drivers of the cars. Passengers constituted considerably less than one-half and pedestrians about one-tenth of the total number of male fatalities.

TABLE 3

PERCENTAGE OF LICENSEES BY 10-YEAR AGE GROUPS[1]

Age	Men	Women	Both Sexes
Under 14	0.02018	0.00000	0.02018
15-24	14.52881	5.17926	19.70807
25-34	18.34937	6.80702	25.15639
35-44	13.55350	6.18821	19.74171
45-54	11.39438	4.80259	16.19697
55-64	8.69712	2.50219	11.19931
65-74	4.89675	0.87441	5.77116
75-84	2.01116	0.20844	1.96400
85-over	0.25560	0.00000	0.25560
Total	73.45127	26.56212	100.01339

[1] Figures based on drivers licensed in Iowa and on 1955 census estimates. These are thought to hold approximately for the United States as a whole.

For women, the results were considerably lower, showing a smaller percentage of female driver fatalities, about the same proportion of female passenger fatalities as men, and somewhat less for pedestrians. These differences seem to reside in the extremes of the distribution, there being more frequent pedestrian fatalities among young boys than among young girls, and also a higher proportion of pedestrian fatalities among men than among women at an older age.

The results compare favorably for the two years. This was as expected from Swanson's calculation of the estimated reliability. One can tell approximately from the results of one year what to expect for another year, providing he has a large enough segment of the population to work with. In this case it involved about 2½ million people, about 1½ million of whom were licensed drivers.

For convenience the data are grouped in 10-year periods, as shown in Table 3. This table offers a basis for comparing the frequency of accidents at different age levels.

The results in Table 4 are derived from previous tables and calculation of the number of drivers, considering the frequency with which they are found in the population. Drivers only are considered. The results were calculated so as to show whether the percentage was in excess or was deficient with respect to the number in the population.

It will be noted that fatalities at age 14 and below are far more than would be expected for both boys and girls. This probably is due to the fact that there are fewer licensed to drive, but there is a certain amount of illegal driving being done throughout the State. The comparison indicates that these figures might be an indication of the amount of illegal driving being done at these ages.

Comparison of the magnitude of the percentages in the two columns readily points out the discrepancies. For example, in the 15-19 age group of male drivers, there were nearly 11.5 percent fatalities, yet they were only 6 percent of the male drivers. It will be noted that for male drivers the excess is rather marked to about age 30. After this the excess occurs occasionally throughout the age range, but it tends to fluctuate.

When the column for women is examined, it is noted that although there is an excess at the earlier age, before 14, the excess is less marked and there is a deficiency down until about the age of 60. In other words, women run a deficiency more or less throughout the age ranges when compared for the frequency with which they are found in the population of drivers.

TABLE 4

PERCENTAGE OF LICENSEES AND FATAL ACCIDENT DRIVERS IN IOWA BY AGE AND SEX

	1955-56 Accident Average (%)					
	Men Drivers		Women Drivers		Both Sexes	
Age	Fatalities [1]	Licensees	Fatalities [1]	Licensees	Fatalities [1]	Licensees
To 14	+ 0.73529	0.02018	+0.14706	—	+ 0.88235	0.02018
15-19	+11.47059	6.02676	-1.02941	2.04480	+12.50000	8.07156
20-24	+15.44118	8.50205	-1.02941	3.13446	+16.47059	11.63651
25-29	+10.00000	9.39665	-2.35294	3.77346	-12.35294	13.17011
30-34	- 5.29411	8.95272	-0.88235	3.03356	- 6.17647	11.98628
35-39	+ 8.08824	7.25768	-0.58824	3.24208	- 8.67647	10.49976
40-44	+ 7.20588	6.29582	-1.17647	2.94613	- 8.38235	9.24195
45-49	- 5.00000	5.97970	-1.02941	2.56272	- 6.02941	8.54242
50-54	- 4.85294	5.41468	-0.88235	2.23987	- 5.73529	7.65455
55-59	+ 5.00000	4.74205	-0.88235	1.51342	- 5.88235	6.25547
60-64	+ 4.55882	3.95507	+1.02941	0.98877	+ 5.58824	4.94384
65-69	+ 3.52941	2.98648	-0.14706	0.60537	+ 3.67647	3.59185
70-74	+ 3.08824	1.91027	-0.58824	0.26904	+ 3.67647	2.17931
75-79	+ 2.64706	1.21073	—	0.14790	+ 2.64706	1.35863
80-84	+ 1.17647	0.54483	—	0.06054	+ 1.17647	0.60537
85+	- 0.14706	0.25560	—	—	- 0.14706	0.25560
Total	88.2+	73.45127	11.76+	26.56212	100.+	100.01339

[1] + indicates more fatalities than expected; minus, fewer fatalities than expected.

For both sexes it is shown that there is an excess in the lower range, as would be expected, and a deficiency through the middle range, with an excess beginning again about age 64, 65 and 66. It is likely the very high range of ages when persons cannot drive much shows a deficiency again. This would be expected, as many older drivers hold their licenses but do not do much driving in traffic.

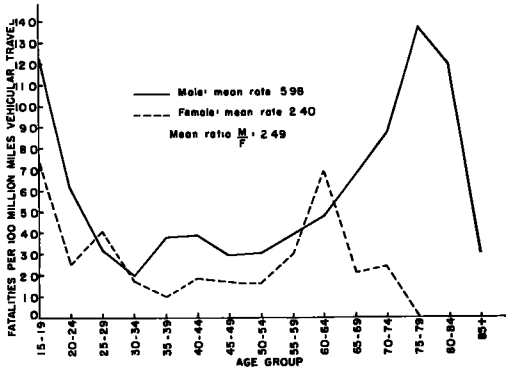

Figure 1. Two-year mean of male and female driver fatalities per 100 million miles vehicular travel for 1955 and 1956, considering drivers only.

To get these data into more meaningful form, corrections were further made for the estimated mileage of sexes for different age levels and the rates calculated for deaths per 100 million vehicle-miles of travel. Analysis of Figure 1 shows considerable difference, even when corrections are made for mileage driven. Young males drive considerably more miles, but the differences still persist in similar fashion throughout the age ranges.

Both sexes tend to improve their records up to around the ages of 30-35 and then remain more or less constant for about a 20-year period. There would be some question as to whether one would need to examine drivers so frequently during the first 15-

year period of their driving, inasmuch as they are improving and there is no reason particularly for calling them in every two years so far as physical traits are concerned. From 30 up to 60 years of age there is not a great deal of change taking place. Here again one might question the advisability of having a driver's examination every two years due to the nature of the changes usually noted. Undoubtedly some persons do change, but where there is illness, an eye operation, or something of similar nature, it would be expected that they would be automatically checked in any efficient system of licensing.

Beginning at about age 60-65 there is evidence that it would be advisable to have a driver's license check every two years. These periodic examinations would seem justified in line with the indication that changes of some type are undoubtedly taking place. It is likely they would be most effective at that time.

CONCLUSIONS

The general conclusions from this study, within the limitations of the data, and when drivers alone are considered, are as follows:

1. There are greater differences in the frequency of accidents among pedestrians, drivers, and passengers, than would be expected from the fact that not all persons are drivers or passengers. Pedestrians show the lowest percentage of fatalities, although they constitute a larger proportion of persons. Hence, it seems that the act of driving is the most serious menace to life in the traffic field. Considering the large percentage of pedestrians and the relatively small percentage of drivers operating at one time the problem becomes magnified.
2. Male drivers seem to be much more lethal to themselves and others than do female drivers. Particulary is this applicable since they exceed in the number driving at one time. Because there are more male drivers licensed, it is reasonable to assume that there are more men driving at any one time than there are women.
3. When mileage is taken into consideration and the best estimates established and graphed, the picture shows a similar result for the number of drivers involved. The differences are magnified, however, and the trend is slightly different. There are more fatalities among the male drivers proportionately and on a mileage basis than there are for female drivers. The ratio for men is about 2.5 that for women with correction for mileage driven.
4. Finally, it may be concluded that there is some question as to whether the driver's license examination every two years is warranted throughout the total age range. It is recommended that this be reviewed and possibly the reexamination set at longer periods up until the age of 55-60, after which it might be wise to make an examination every two years, or possibly every year for certain groups. Exceptions, of course, would be those who have reasons to be examined because of being in an accident or otherwise, who should be called in periodically for recheck in order to keep them in line.

REFERENCES

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