AUTOMOBILE ACCIDENT STATISTICS BY "AGE OF DRIVER"

BY

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In the belief that the recording of the significant original statistical compilations of automobile accident experience by "age of driver" may be of value to the Society and to the Insurance Industry the writer presents the available statistical material on this subject.

With the advent of the speedy light car and the disappearance of the Model T Ford in the early '30's the death knell of the W, X, Y differential rating of private passenger cars by weight, power and purchase price was sounded. Combined W and X differentials sufficed for a while but soon a car was a car for insurance rating purposes and competitive weapons of differing types were forged to entice the accident free car owner.

In February 1938 the safe driver award plan made its debut but when New York failed to go along and the plan ran into other heavy going the first "age of driver", in combination with "mileage" and "business use", plan made its appearance at the National Bureau in April 1939 and later in the year in New York. In this plan the three classes are summarized as follows:

Class A-1—Non-business use, estimated annual mileage not in excess of 7500 miles, no more than two operators in the household none of whom is under 25.
Class A—Non-business use, not eligible for Class A-1.
Class B—Business use.

Backing up "age of driver" as one of the rating elements were certain figures collected by the Connecticut Motor Vehicle Department in 1932-1936 which indicated that drivers under twenty-five were involved in 37% more accidents and 62% more fatal accidents than the average. As far as mileage was concerned this was considered a very tangible measure of hazard which could be easily substantiated with logic and certainly business use would usually mean greater mileage. The differentials chosen were not severe and picked with an idea to possibly widening them as experience indicated the need. The pre-war experience by policy year for states where Classes A-1, A and B were in effect, excluding Indiana and New York, is as follows:

			Bodily Injury			
Policy	*Distribution %*			*Pure Premium*		
Year	*A-1*	*A*	*B*	*A-1*	*A*	*B*
1939	21.2	57.6	21.2	$7.30	$11.97	$17.31
1940	20.8	56.2	23.1	7.64	12.22	14.68
1941	21.4	58.8	19.8	7.46	12.50	13.77
			Property Damage			
1939	22.2	55.3	22.5	2.44	3.83	5.48
1940	21.6	53.9	24.5	2.87	4.31	5.35
1941	22.2	56.8	20.9	3.19	4.81	5.95

Under this plan "age of driver" and "mileage" factors were not differentiatable but no immediate thought was given to separating them. Soon the country was plunged into war and faced with gas rationing making it imperative that insurance premiums vary with amount of gas ration. Statistics later substantiated this rating basis. The war-time statistics in Massachusetts showing a distribution of claim costs under A, B and C gasoline rations so definitely aligned mileage and claim costs that many considered that the whole rating answer was involved in mileage alone. It was not immediately apparent that "age" as a rating factor was practically non-existent during the war with a large proportion of the young drivers in the service. Massachusetts war figures for private passenger cars are as follows:

1943 PRIVATE PASSENGER CAR EXPERIENCE
Statewide

Ration Symbol	*Earned Car Years*	*% Dist.*	*Losses Incurred*	*No. of Claims*	*Claim Freq.*	*Ave. Claim Cost*	*Pure Prem.*
A	298 497.70	47%	2 792 352	9 077	3.0	308	9.35
B	194 010.50	31	2 217 633	7 419	3.8	299	11.43
C	139 321.10	22	2 425 032	8 490	6.1	286	17.41
Total	631 829.30		7 435 017	24 986	4.0	298	11.77

1944 PRIVATE PASSENGER CAR EXPERIENCE
Statewide

Ration Symbol	*Earned Car Years*	*% Dist.*	*Losses Incurred*	*No. of Claims*	*Claim Freq.*	*Ave. Claim Cost*	*Pure Prem.*
A	279 700.60	44%	3 266 920	10 235	3.7	319	11.68
B	198 914.90	32	2 519 433	7 901	4.0	319	12.67
C	154 745.70	24	2 804 622	9 026	5.8	311	18.12
Total	633 361.20		8 590 975	27 162	4.3	316	13.56

Immediately after the war a further attempt was made in Massachusetts to obtain statistics for rate making wherein both age and mileage factors would be recognized. In 1945 and in 1946 the Commissioner of Insurance under dates of September 21, 1945 and August 23, 1946 directed the insurance companies to obtain certain data with respect to the use of private passenger cars segregated by the age of the drivers using each car, by the expected mileage of the car during the subsequent year, and by business or non-business use. In accordance with the Commissioner's directions, in writing all compulsory liability insurance for the years 1946 and 1947 there was obtained from each applicant for insurance a signed questionnaire giving the pertinent

information. The questionnaires were obtained by the brokers and agents from their customers at the same time that the registration application was completed. The completed questionnaires were then transmitted to the insuring company and were utilized by the insuring company in preparing statistics in accordance with Massachusetts Automobile Statistical Plan requirements.

Obviously the base was hereby laid for the accumulation of by far the largest volume of statistics yet available on this subject. These statistics for 1946 policy year, not available until the summer of 1947, shed considerably more light on this whole area of age and mileage as factors in automobile rate making.

MASSACHUSETTS COMPULSORY LIABILITY EXPERIENCE

PRIVATE PASSENGER CARS—POLICY YEAR 1946

Private Passenger Car Experience Segregated Into Significant Age and Mileage Groups

Classification	*Earned Car Years*	*Losses Incurred*	*No. of Claims*	*Claim Freq.*	*Ave. Claim Cost*	*Pure Prem.*
Non-Business Use						
No op. under 25 yrs., under 7500 mi.	285 790.70	4 434 987	13 685	4.8	324	15.52
No op. under 25 yrs., over 7500 mi.	114 849.90	2 072 447	6 097	5.3	340	18.04
An op. under 25 yrs., under 7500 mi.	46 782.70	1 493 970	4 713	10.1	317	31.93
An op. under 25 yrs., over 7500 mi.	21 998.00	793.696	2 157	9.8	368	36.08
Total	469 421.30	8 795 100	26 652	5.7	330	18.74
Business Use						
No op. under 25 yrs., under 7500 mi.	50 261.10	877 725	2 783	5.5	315	17.46
No op. under 25 yrs., over 7500 mi.	75 417.30	1 512 280	4 978	6.6	304	20.05
An op. under 25 yrs., under 7500 mi.	8 080.10	234 641	792	9.8	296	29.04
An op. under 25 yrs., over 7500 mi.	13 363.80	441 454	1 300	9.7	340	33.03
Total	147 122.30	3 066 100	9 853	6.7	311	20.84
Classified to Age Only						
No operator under 25 years	11 622.20	233 613	741	6.4	315	20.10
An operator under 25 years	2 090.00	110 966	271	13.0	409	53.09
Total	13 712.20	344 579	1 012	7.4	340	25.13
Total Classified	630 255.80	12 205 779	37 517	6.0	325	19.37

A further refinement of the Age and Mileage plan was effected in National Bureau states in March 1948 when the Class A-1, A-2, A-3 and B plan became effective summarized as follows:

Class A-1—Individually owned cars—Non-business with no operator under age 25—annual mileage 7500 miles or under.

Class A-2—Individually owned cars—Non-business with no operator under age 25—unlimited mileage.

Class A-3—Individually owned cars—Non-business—no age or mileage limitations.

Class B—All other private passenger automobiles including those owned by corporations, partnerships or unincorporated associations.

The statistical background for this plan lies in the Massachusetts policy year 1946 Private Passenger Car experience segregated into significant age and mileage groups.

It began to be obvious from these statistics that while mileage had some minor bearing that the age factor was the deciding one from a rate making standpoint.

Policy year 1947 statistics, gathered in essentially the same manner under Massachusetts Statistical Plan requirements produced further substantiating results.

MASSACHUSETTS COMPULSORY LIABILITY EXPERIENCE
PRIVATE PASSENGER CARS—POLICY YEAR 1947
Private Passenger Car Experience Segregated Into Significant Age and Mileage Groups

Classification	*Earned Car Years*	*Losses Incurred*	*No. of Claims*	*Claim Freq.*	*Ave. Claim Cost*	*Pure Prem.*
Non-Business Use						
No op. under 25 yrs., under 7500 mi.	267 864.30	3 817 983	11 951	4.5	319	14.25
No op. under 25 yrs., over 7500 mi.	135 736.10	2 261 974	6 923	5.1	327	16.66
An op. under 25 yrs., under 7500 mi.	48 855.50	1 386 402	4 278	8.8	324	28.38
An op. under 25 yrs., over 7500 mi.	33 654.90	986 871	3 124	9.3	316	29.32
Total	486 110.80	8 453 230	26 276	5.4	322	17.39
Business Use						
No op. under 25 yrs., under 7500 mi.	38 975.40	819 337	2 499	6.4	328	21.02
No op. under 25 yrs., over 7500 mi.	68 348.60	1 417 520	4 569	6.7	310	20.74
An op. under 25 yrs., under 7500 mi.	7 060.40	231 585	679	9.6	341	32.80
An op. under 25 yrs., over 7500 mi.	14 732.00	479 866	1 549	10.5	310	32.57
Total	129 116.40	2 948 308	9 296	7.2	317	22.83
Classified to Age Only						
No operator under 25 years	29 770.20	568 821	1 694	5.7	336	19.11
An operator under 25 years	6 523.90	252 643	673	10.3	375	38.73
Total	36 294.10	821 464	2 367	6.5	347	22.63
Total Classified	651 521.30	12 223 002	37 939	5.8	322	18.76

To confirm that a section of the state would produce essentially the same results, the important county of Middlesex representing approximately 22% of the state was segregated from the rest of the statistics and separately analyzed with results so closely in line with the statewide figures that they are not repeated in this record.

It had become quite plain to insurance company executives that these Massachusetts facts pointed to "age of driver" as the determining factor rather than "mileage", hence recommendations to Massachusetts authorities followed this pattern both as respects policy year 1949 and 1950 rates. Classes and selected relativities which went approximately half way of indications were set up as follows:

Class 1—Individually owned cars—Non-business with no operator under age 25.

Selected relativity—75

Class 2—Individually owned cars—Business and Non-business with operator under age 25.

Selected relativity—100

Class 3—All other private passenger automobiles including all private passenger automobiles owned by corporations, partnerships or unincorporated associations.

Selected relativity—85

Failing to convince the Massachusetts authorities that this private passenger classification plan should apply to Massachusetts Compulsory Automobile Insurance, one large company proceeded to apply "age of driver" as a rating basis to Massachusetts Automobile Property Damage rates in 1949 and this basis was followed by practically all companies in 1950 as respects property damage with the same differential relativities as outlined immediately above.

That the effect of the Massachusetts 1947 policy year Private Passenger Car Experience Segregated into Significant Age and Mileage Groups was influencing underwriting opinion in other states is shown by the fact that in 1949 New York established a clearly defined low age group class with a substantial differential. Several other statistical compilations included in the following pages, particularly the "Veness Report" also had a marked influence on this decision in New York. And other jurisdictions were to follow this pattern.

Effective March 20, 1950 the same rating basis as that applicable to automobile property damage in Massachusetts was established for bodily injury and property damage in National Bureau states. The outline of classifications is the same as that set forth immediately above but sharper differentials more in line with statistical indications were selected: Class 1—60, Class 2—100, Class 3—87.5.

Other statistical studies involving smaller volumes of data have been made and are recorded here to complete the rather voluminous statistical record on this subject.

The following figures have been taken in summary form from data prepared by the Registry of Motor Vehicles of the Commonwealth of Massachusetts. The data are based on a sampling of 83,000 1948 and 1949 licensed operators from a total approximating 1,500,000, and from practically the complete record of 1948 accident involvements, totaling 42,709.

Age Group	*Percentage of Licensed Drivers*	*Percentage of Accident Involvements*	*Index Showing Ratio to Average*
16-24	14.8%	17.8%	1.203
25 & over	85.2%	82.2%	.965

The conclusions to be drawn from these figures are that, taken as a whole, operators in the age group 16-24 are involved in 20.3% more than their share of accidents, and conversely, operators in the age group of 25 and over are involved in 3.5% less than their share of accidents.

The study of the New York State Motor Vehicle Department covering 1947 accidents otherwise known as the "Veness Report", appearing in the January 1949 issue of "Best's Magazine" contains the following summary showing the New York Motor Vehicle Department's results from their study of accidents by age of driver.

	Licensed Drivers		*Fatal Accidents*		*Non-Fatal*	
Age Group	*Total*	*%*	*Total*	*%*	*Total*	*%*
Under 18	1 169	1.3	19	1.3	835	1.5
18-20	3 834	4.4	123	8.8	4 287	7.9
21-24	7 588	8.7	258	18.4	7 797	14.4
25-29	11 699	13.4	177	12.6	8 647	16.0
30-39	22 501	25.9	324	23.1	13 139	24.2
40-49	17 655	20.3	234	16.7	9 583	17.7
50-59	13 388	15.3	156	11.1	6 476	11.9
60-64	4 281	4.9	49	3.5	1 763	3.3
65 & over	5 054	5.8	64	4.5	1 677	3.1

		% of		*Above (+) or Below (−) Average*	
Age Group	*% of Operators*	*Fatal Accidents*	*All Accidents*	*Fatal Accidents*	*All Accidents*
Below 25	14.4%	28.5%	23.8%	+97.9%	+65.3%
25 & over	85.6	71.5	76.2	−16.5	−11.0

Additional data appearing on the driving record of youthful automobile operators comes from the New Jersey State Safety Council, Inc. and appears in the August 1949 issue of "Safety Briefs" which is published monthly by this Council. I quote the following from the article in "Safety Briefs" entitled "Fatal Accident Rates of Youthful Drivers":

"The steadily rising trend of accidents involving youthful drivers, especially those between 18 and 24 years of age, is a matter of gravest concern to everyone engaged in highway safety activities.

In 1946 this group of drivers was involved in 24.8 per cent of all fatal accidents. In 1947 the percentage was 25.3. Last year it rose again to 26.9.

In view of the fact that drivers in this age group make up well under 20 per cent of the total of all drivers, these figures are all the more startling. They leave no room for doubt that young drivers are involved in far more than their statistical share of accidents."

"In 1947 youthful drivers between the ages of 18 and 24 years were involved in 166 fatal accidents or 21.62 per cent of the total traffic fatalities in the state. Last year that same age group of drivers was involved in 202 fatal accidents or close to 27 per cent of the total traffic fatalities."

Accident statistics for the Province of Ontario where complete studies covering calendar year 1948 have been made as to the number and percentage of accidents involving drivers of various age groups with the corresponding number and percentage of the total number of licensed drivers is included because of the inescapable facts presented showing how much worse the driver accident record of the 18-24 year old driver age group is in comparison with the average.

Age Group	*No. of Licensed Drivers*		*Drivers Involved in Accidents*		*Index Showing Ratio to Average*
Under 18	49 468	4.1%	1 369	3.2%	.780
18-24	213 557	17.7	11 084	25.7	1.452
25-40	509 158	42.2	18 403	42.7	1.012
41-54	278 710	23.1	8 183	19.0	.823
55-64	108 588	9.0	2 849	6.6	.733
65 & over	47 055	3.9	1 187	2.8	.718
	1 206 536	100.0%	43 075	100.0%	

A comprehensive study of traffic-accident involvement by driver-age was made by the Center for Safety Education at New York University for the State of Connecticut, and later, for Massachusetts and Wisconsin. To these have been added from National Bureau figures the states of Mississippi and Virginia.

(1)	(2)	(3)	(4)	(5)
State	*Age Group*	*Per Cent of Operators*	*Per Cent of Drivers in Accidents*	*Involvement Index* (4) ÷ (3)
Connecticut	Under 25	16.7%	25.4%	1.52
	25 & over	83.3	74.6	.90
Massachusetts	Under 25	14.7	18.0	1.22
	25 & over	85.3	82.0	.96
Wisconsin	Under 25	20.1	28.8	1.43
	25 & over	79.9	71.1	.89
Mississippi	Under 25	17.7	26.5	1.50
	25 & over	82.3	73.5	.89
Virginia	Under 25	18.7	29.3	1.57
	25 & over	81.3	70.7	.87

The most recent development in "age of driver" statistics was a study of Massachusetts Compulsory Bodily Injury claims in the spring of 1950 to positively establish that the youthful driver was actually causing the accidents. It had been alleged that no one knew positively that the young driver caused the accident, that car exposure was segregated in accordance with the potential young driver being in the household. The statistical results speak for themselves in this regard.

It will be noted from this study that segregation of statistical results by actual year by year age of driver reasonably substantiates the age groupings of the various plans which separately rate cars with operators under 25.

The statistical departments of several of the larger company members of the Massachusetts Bureau made samplings of 11,247 bodily injury claims taken from 1949 calendar year settlements in accordance with rigid sampling requirements set down by the Actuarial Committee of the Massachusetts Automobile Rating and Accident Prevention Bureau. The percentage distribution of licenses issued by age of driver was furnished by the Massachusetts Registry of Motor Vehicles from a study completed by the Registry in the spring of 1949.

AGE OF DRIVER AT TIME OF ACCIDENT STUDY

Bodily Injury

(1) Age of Driver	(2) No. of Claims	(3) Amount of Loss	(4) % of Total Claims	(5) % of Total Amount	(6) % of Licenses	Differentials (7) Claims (4)÷(6)	Differentials (8) Amount (5)÷(6)	(9) Average Claim Cost (3)÷(2)
16	119	43 606	1.06	1.16	.45	2.356	2.578	366
17	186	57 102	1.65	1.52	.96	1.719	1.583	307
18	251	86 999	2.23	2.32	1.06	2.104	2.179	346
19	330	120 266	2.94	3.20	1.41	2.078	2.269	364
20	356	127 092	3.17	3.38	1.75	1.811	1.931	357
21	487	162 339	4.33	4.32	2.07	2.092	2.087	333
22	429	151 111	3.81	4.02	2.19	1.740	1.836	352
23	393	147 407	3.50	3.92	2.15	1.623	1.823	375
24	483	152 321	4.29	4.05	2.74	1.566	1.478	315
16—24	3 034	1 048 246	26.98	27.89	14.78	1.825	1.887	345
25	447	135 802	3.97	3.61	2.97	1.337	1.215	303
26	364	127 320	3.24	3.39	2.98	1.087	1.138	349
27	349	132 358	3.10	3.52	3.05	1.016	1.154	379
28	380	111 893	3.38	2.98	3.14	1.076	.949	294
29	283	82 912	2.52	2.20	2.99	.843	.739	307
30	284	121 181	2.53	3.22	2.72	.930	1.184	426
31	270	82 908	2.40	2.21	2.98	.805	.742	307
32	268	95 498	2.38	2.54	2.87	.829	.885	356
33	274	92 156	2.44	2.45	2.94	.830	.833	336
34	246	87 802	2.19	2.34	2.70	.811	.867	356
35—39	1 066	327 210	9.48	8.70	12.92	.733	.673	306
40—44	1 000	283 063	8.89	7.53	11.43	.778	.659	283
45—49	821	255 222	7.30	6.79	9.12	.800	.745	310
50—54	791	289 451	7.03	7.70	7.74	.908	.995	365

AGE OF DRIVER AT TIME OF ACCIDENT STUDY (Cont.)

Bodily Injury (cont.)

(1) Age of Driver	(2) No. of Claims	(3) Amount of Loss	(4) % of Total Claims	(5) % of Total Amount	(6) % of Licenses	Differentials (7) Claims (4)÷(6)	Differentials (8) Amount (5)÷(6)	(9) Average Claim Cost (3)÷(2)
55—59	621	203 629	5.52	5.42	6.06	.911	.894	327
60—64	344	126 117	3.06	3.36	4.08	.750	.824	366
65—69	224	81 981	1.99	2.18	2.47	.806	.883	365
70 and over	181	74 137	1.61	1.97	2.06	.782	.956	409
25 and over	8 213	2 710 650	73.02	72.11	85.22	.857	.846	330
GRAND TOTAL	11 247	3 758 896	100.00	100.00	100.00	1.000	1.000	334

Comparably a similar study was completed of Massachusetts Automobile Property Damage claims with very similar results.

Property Damage

(1) Age of Driver	(2) No. of Claims	(3) Amount of Loss	(4) % of Total Claims	(5) % of Total Amount	(6) % of Licenses	Differentials (7) Claims (4)÷(6)	Differentials (8) Amount (5)÷(6)	(9) Average Claim Cost (3)÷(2)
16	168	11 778	1.11	1.22	.45	2.467	2.711	70
17	316	22 771	2.09	2.35	.96	2.177	2.448	72
18	331	26 787	2.19	2.77	1.06	2.066	2.613	81
19	359	25 465	2.37	2.63	1.41	1.681	1.865	71
20	436	33 266	2.88	3.43	1.75	1.646	1.960	76
21	527	37 115	3.48	3.83	2.07	1.681	1.850	70
22	509	37 343	3.36	3.85	2.19	1.534	1.758	73
23	520	36 934	3.43	3.81	2.15	1.595	1.772	71
24	539	34 926	3.56	3.61	2.74	1.299	1.318	65

AGE OF DRIVER AT TIME OF ACCIDENT STUDY (Cont.)

Property Damage (Cont.)

(1) Age of Driver	(2) No. of Claims	(3) Amount of Loss	(4) % of Total Claims	(5) % of Total Amount	(6) % of Licenses	Differentials (7) Claims (4)÷(6)	Differentials (8) Amount (5)÷(6)	(9) Average Claim Cost (3)÷(2)
16—24	3 705	266 385	24.47	27.50	14.78	1.656	1.861	72
25	527	35 781	3.48	3.69	2.97	1.172	1.242	68
26	458	28 221	3.02	2.91	2.98	1.013	.977	62
27	443	30 371	2.92	3.14	3.05	.957	1.030	69
28	464	29 009	3.06	2.99	3.14	.975	.952	63
29	398	23 875	2.63	2.46	2.99	.880	.823	60
30	394	22 915	2.60	2.37	2.72	.956	.871	58
31	409	26 707	2.70	2.76	2.98	.906	.926	65
32	371	21 672	2.45	2.24	2.87	.854	.780	58
33	335	19 913	2.21	2.06	2.94	.752	.701	59
34	329	20 479	2.17	2.11	2.70	.804	.781	62
35—39	1 557	95 354	10.28	9.84	12.92	.796	.762	61
40—44	1 363	79 475	9.00	8.20	11.43	.787	.717	58
45—49	1 153	73 272	7.61	7.56	9.12	.834	.829	64
50—54	1 143	74 869	7.55	7.73	7.74	.975	.999	66
55—59	799	51 301	5.27	5.30	6.06	.870	.875	64
60—64	618	33 163	4.08	3.42	4.08	1.000	.838	54
65—69	362	18 527	2.39	1.91	2.47	.968	.773	51
70 and over	320	17 449	2.11	1.80	2.06	1.024	.874	55
25 and over	11 443	702 353	75.53	72.50	85.22	.886	.851	61
GRAND TOTAL	15 148	968 738	100.00	100.00	100.00	1.000	1.000	64

The record of the youthful driver, age group 16 through 24, is not a good one and each sizable statistical analysis made, whether it be pre-war or post-war, tells the same story. Analysis of each year by year age segment indicates that the split at age 25 for rating purposes is a proper one. A certain degree of parental control and possibly some effect of driving-training in schools, coupled with smaller volumes of experience, are probably responsible for somewhat varying results among the 16 and 17 year olds but unless several age rate groupings were to be made the present split at age 25 should be continued. Recognition of wider differentials in the March 1950 National revision is very much in line with experience with even higher rates for the under 25 group in relation to the other groups justified.