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PRELIMINARY STUDY ON THE RELATIONSHIP BETWEEN
TRAFFIC VIOLATION CONVICTIONS AND TRAFFIC ACCIDENTS
OF DRIVERS INVOLVED IN FATAL ACCIDENTS
IOWA, 1972

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SUMMARY

Salient points of this preliminary report are:

1. Traffic violation convictions and accidents of drivers involved in fatal accidents are positively correlated with each other. Increased violation convictions frequency was found to be accompanied with increase in accident involvement.

2. Differential accident rates for each conviction count was calculated to be 0.208 accidents per driver for drivers with 0 conviction, .505 accidents per driver for drivers with 1 conviction, .919 accidents per driver for drivers with 2 convictions, 1.125 accidents per driver for drivers with 3 convictions and 1.214 accidents per driver for drivers with 4 or more convictions.

3. Accidents per driver in the 1 conviction group is 2.43 times as many compared to the 0 conviction group, the 2 conviction group is 4.42 times as many as in the 0 group, the 3 conviction group is 5.41 times and the last group is 5.84 times as many as in the 0 conviction group.

4. Of the total 1,055 drivers under study, 64.1% had no conviction record, 71.4% had not been involved in any accidents, and 52.6% had neither accidents nor convictions.

5. This study however includes accident connected traffic violation convictions which inflates the relationship. The removal of these convictions will give a better relationship.

6. A comprehensive study on the driving records of a population of normal Iowa drivers is necessary to determine how bad this group of drivers is.

7. This study also indicated that the relationship is a strong function of age although data was not enough to support this fact. Three years data on drivers involved in fatal accidents is necessary.

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1.0 Collection of Data:

Data on more than a thousand drivers involved in fatal accidents in 1972 were collected from the drivers file. Number of convictions and accidents recorded on the file three years prior to the involvement in the fatal accident were scanned and compiled for each driver. A total of 1,132 drivers were involved in fatal accidents and out of these, 1,055 drivers had records available representing 93.2%.

2.0 Objectives:

1. Primary objective of this study is to determine the relationship between traffic accidents and traffic violation convictions for drivers involved in fatal accidents.

2. To find out the percentage or proportion of drivers which have not been involved in any accidents, percentage of drivers which did not have a conviction record, percentage of drivers which had neither accidents nor convictions.

3. To investigate the role of age in determining the nature of this relationship.

4. Another objective is to assess the accuracy of the drivers record file on convictions and accidents.

3.0 Results of the Study:

3.1 Age Distribution of Drivers:

The age distribution of drivers involved in fatal accidents are shown in Table 1 by five year age group and the age distribution by single years is shown in Chart 1. Chart 1 reflects that there is a large number of young drivers,

38.1% of total are below 25 years of age and a population of older drivers whose frequency follows a linear trend with increasing age. Peak age was found to be 18 followed by 19 years while the median age was calculated to be 30.7 or 31 years, 25% of total drivers were below 21 years and 75% were less than 50 years.

3.2 Distribution of Driver Convictions and Accidents:

Of the total 1,055 drivers under study, 64.1% had no conviction record, 71.4% had not been involved in any accidents, 52.6% had neither accidents nor convictions. These facts are presented in Tables 2, 3, and 4.

3.3 Differential Accident Rates:

To get differential accident rates by number of convictions, number of accidents per driver was calculated for each conviction count. This transformation is necessary to standardize the data and for ease in comparison. This is reflected in the following tabulation.

DIFFERENTIAL ACCIDENT RATES BY NUMBER OF CONVICTIONS FOR
DRIVERS INVOLVED IN FATAL ACCIDENTS: IOWA, 1972
(Three Years Prior Record)^{1/}

Convictions	Number of Drivers	Number of Accidents	Accidents per Driver	"Times as Many" ^{2/}
0	677	141	.208	1.00
1	210	106	.505	2.43
2	86	79	.919	4.42
3	40	45	1.125	5.41
4 or more	42	51	1.214	5.84
Total	1,055	422	0.400	-

^{1/} Includes convictions, those which have resulted from a reported accident.

^{2/} This column represents the relative increase in accident rate over the "0" conviction group.

The preceding tabulation reflects the number of accidents per driver by various conviction count. One can see that drivers who had no conviction record three years prior had 0.208 accidents per driver or 20.8 accidents per 100 drivers while those drivers in 4 or more convictions category had 1.214 accidents or 121.4 accidents per 100 drivers. Thus, the accidents for the latter group is 5.8 times that of the no conviction group. One will note that as conviction count increases, there is an increase in accidents per driver.

3.4 The Role of Age in the Relationship:

To investigate the role of age in the relationship between accidents and convictions, accidents per driver as a function of conviction count was calculated for each five year age group. This is shown in Table 6. To visualize the trend in each age group, accidents per driver by conviction count was charted for each age group as reflected in Chart 3. Although there is not enough data for some age groups, Chart 3 generally shows an upward trend. One will notice that persons with the lowest (0 convictions) conviction count have the least number of accidents and this is true for almost all age groups. Because there is not enough data on this study, one will observe that there are fluctuations in the data. However, the trend indicates a positive linear relationship between convictions and accidents for each age group.

3.5 Measurement of Relationship:

To determine the degree of relationship between convictions and accidents, the data was charted and is presented in Chart 2. Correlation coefficient which is a measure of degree of relationship was calculated to be 0.80 which is an indication of a high degree of relationship between the two variables. An increasing number of convictions is accompanied by an increasing number of

accidents. In this study, however, those violations that occurred in connection with the accidents were included and this somewhat inflates the data. If this accidents connected convictions are removed, a causative relationship between two independent events could be established; driving that results in violations and driving that results in accidents.

4.0 Conclusion:

This study strongly indicates that convictions and accidents are statistically significant and positively correlated with each other. Increased violations convictions frequency was found to be accompanied with increase in accident involvement. Although the data was not sufficient enough, the study indicated that the relationship is a strong function of age.

Accident connected convictions which inflates the relationship between convictions and accidents when removed will show a non-spurious relationship, this may yield a lower correlation coefficient, however it is most likely to be highly significant.

5.0 Comments:

This study could be used for comparison between this group of drivers involved in fatal accidents with the characteristics of a normal population of Iowa drivers in an effort to determine how bad these group of drivers are. Hence, this calls for a comprehensive study on the drivers record of all Iowa drivers.

To get a better relationship between traffic violation convictions and accidents by age group, it is necessary that three years data on drivers involved in fatal accidents be used instead of only one year.

References:

1. John A. Green. The Relationship Between Traffic Violation Convictions and Traffic Accidents in Washtenaw County, Michigan. HIT LAB Reports - July, 1972, Volume 2 Number 11, Highway Safety Research Institute, University of Michigan.
2. The 1964 California Record Study, Part 4, May 1965. Department of Motor Vehicles, Research and Statistics Section.

Definitions:

1. Number of traffic convictions measures the extent to which an individual has been involved in traffic events or actions that result in his being charged with an illegal act which in turn results in subsequent conviction by the judgment of a court or jury.

2. Accidents are traffic events and number of accidents is a straight forward measure of the degree to which an individual is involved whether causally or incidentally in highway collisions.

3. Correlation coefficient is the degree of relationship between two variables, independent of the units or terms in which they are originally expressed, designated as r which ranges from -1 to $+1$ (-1 and $+1$ being negatively perfect and positively perfect correlation).

TABLE 1: DISTRIBUTION OF DRIVERS INVOLVED IN
FATAL ACCIDENTS BY AGE GROUP: IOWA, 1972^{1/}

Age Group	Number of Drivers	Percent of All Drivers	Cumulative Frequency (%)
15-19	208	19.7	19.7
20-24	194	18.4	38.1
25-29	105	10.0	48.1
30-34	85	8.1	56.2
35-39	73	6.9	63.1
40-44	59	5.6	68.7
45-49	63	6.0	74.7
50-54	64	6.1	80.8
55-59	39	3.7	84.5
60-64	40	3.8	88.3
65-69	42	4.0	92.3
70-74	26	2.5	94.8
75 & up	57	5.4	100.2
Total	1,055	100.0%	

^{1/} Details do not always add up to 100% due to rounding.

TABLE 2: ACCIDENT RECORD (THREE YEARS PRIOR RECORD)
OF DRIVERS INVOLVED IN FATAL TRAFFIC ACCIDENTS BY AGE GROUP
IOWA, 1972^{1/}

Age Group	Total Drivers		Number of Accidents									
	No.	%	0		1		2		3		4 or more	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
15-19	208	19.7	153	20.3	39	17.6	13	24.1	1	5.3	2	28.6
20-24	194	18.4	116	15.4	51	23.0	15	27.8	10	52.6	2	28.6
25-29	105	10.0	62	8.0	27	12.2	12	22.2	3	15.8	1	14.3
30-34	85	8.1	60	8.0	19	8.6	4	7.4	2	10.5	-	-
35-39	73	6.9	54	7.2	17	7.7	1	1.8	1	5.3	-	-
40-44	59	5.6	47	6.2	7	3.2	4	7.4	-	-	1	14.3
45-49	63	6.0	48	6.4	12	5.4	1	1.8	1	5.3	1	14.3
50-54	64	6.1	51	6.8	11	5.0	1	1.8	1	5.3	-	-
55-59	39	3.7	32	4.2	5	2.2	2	3.7	-	-	-	-
60-64	40	3.8	31	4.1	8	3.6	1	1.8	-	-	-	-
65-69	42	4.0	39	5.2	3	1.4	-	-	-	-	-	-
70-74	26	2.5	21	2.8	5	2.2	-	-	-	-	-	-
75 & up	57	5.4	39	5.2	18	8.1	-	-	-	-	-	-
Total	1,055	100.0	753	100.0	222	100.0	54	100.0	19	100.0	7	100.0

Accidents	Number of Drivers	% Distribution
0	753	71.4%
1	222	21.0
2	54	5.1
3	19	1.8
4 or more	7	0.7
Total	1,055	100.0%

^{1/} Details do not always add up to 100% due to rounding.

TABLE 3: CONVICTION RECORD (THREE YEARS PRIOR RECORD)
OF DRIVERS INVOLVED IN FATAL ACCIDENTS BY AGE GROUP:
IOWA, 1972^{1/}

Age Group	Total Drivers		Number of Convictions									
	No.	%	0		1		2		3		4 or more	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
15-19	208	19.7	139	20.6	32	15.2	17	19.8	10	25.0	10	23.2
20-24	194	18.4	86	12.7	50	23.8	22	25.6	17	42.5	19	44.2
25-29	105	10.0	55	8.1	26	12.4	14	16.3	5	12.5	5	11.6
30-34	85	8.1	51	7.5	21	10.0	6	7.0	3	7.5	4	9.3
35-39	73	6.9	42	6.2	20	9.5	8	9.3	1	2.5	2	4.6
40-44	59	5.6	39	5.8	10	4.8	7	8.1	1	2.5	2	4.6
45-49	63	6.0	47	7.0	13	6.2	2	2.3	-	-	1	2.3
50-54	64	6.1	49	7.2	11	5.2	3	3.5	1	2.5	-	-
55-59	39	3.7	31	4.6	6	2.9	1	1.2	1	2.5	-	-
60-64	40	3.8	35	5.2	3	1.4	1	1.2	1	2.5	-	-
65-69	42	4.0	36	5.3	6	2.9	-	-	-	-	-	-
70-74	26	2.5	23	3.4	3	1.4	-	-	-	-	-	-
75 & up	57	5.4	43	6.4	9	4.3	5	5.8	-	-	-	-
Total	1,055	100.0	676	100.0	210	100.0	86	100.0	40	100.0	43	100.0

Convictions	Number of Drivers	% Distribution
0	676	64.1%
1	210	19.9
2	86	8.2
3	40	3.8
4 or more	43	4.1
All Drivers	1,055	100.0% ^{1/}

^{1/} Details do not always add up to 100% due to rounding.

TABLE 4: NUMBER OF DRIVERS AND PERCENT OF ALL DRIVERS INVOLVED
IN FATAL ACCIDENTS BY NUMBER OF CONVICTIONS AND BY NUMBER OF ACCIDENTS:
IOWA, 1972 (Three Years Prior Record)

Number of Accidents	Number of Convictions						Total Persons
	0	1	2	3	4 or more		
0	555 (52.7%)	127 (12.0)	42 (4.0)	15 (1.4)	14 (1.2)	753	
1	103 (9.8)	66 (6.3)	26 (2.5)	12 (1.1)	15 (1.4)	222	
2	16 (1.5)	11 (1.0)	11 (1.0)	8 (0.8)	8 (0.8)	54	
3	2 (0.2)	6 (0.6)	2 (0.2)	4 (0.4)	5 (0.5)	19	
4 or more	-	-	5 (0.5)	1 (0.1)	1 (0.1)	7	
Total Drivers	676	210	86	40	43	1,055	

Note: Numbers in parentheses represent percent of total drivers in that particular cell.

TABLE 5: NUMBER AND PERCENT DISTRIBUTION OF CONVICTIONS
 BY NUMBER OF ACCIDENTS FOR DRIVERS INVOLVED IN FATAL TRAFFIC ACCIDENTS:
 IOWA, 1972^{1/}
 (THREE YEAR PRIOR RECORD)^{2/}

Number of Accidents	Total		Number of Convictions											
	No.	%	0		1		2		3		4 or more			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
0	753	100.0	555	73.7	127	16.9	42	5.6	15	2.0	14	1.8		
1	222	100.0	103	46.4	66	29.7	26	11.7	12	5.4	15	6.8		
2	54	100.0	16	29.6	11	20.4	11	20.4	8	14.8	8	14.8		
3	19	100.0	2	10.5	6	31.6	2	10.5	4	21.0	5	26.3		
4 or more	7	100.0	-	-	-	-	5	71.4	1	14.3	1	14.3		
Total	1,055	100.0	676	64.1	210	19.9	86	8.2	40	3.8	43	4.1		

^{1/} Details do not always add up to 100% due to rounding.

^{2/} Includes accident-connected convictions.

TABLE 6: ACCIDENTS PER DRIVER FOR DRIVERS INVOLVED
IN FATAL ACCIDENTS AS A FUNCTION OF CONVICTION
COUNT BY AGE GROUP: 1972, IOWA (3 YEARS PRIOR RECORD)^{1/}

No. of Convictions Age Group	0	1	2	3	4
15-19	.140	.469	.941	1.600	1.100
20-24	.279	.560	.954	1.118	1.684
25-29	.309	.538	1.714	1.200	.800
30-34	.470	.381	.330	1.000	1.000
35-39	.186	.600	.250	-	-
40-44	.179	.100	1.000	-	2.000
45-49	.128	.615	3.000	-	1.000
50-54	.163	.454	.667	1.000	-
55-59	.129	.667	1.000	-	-
60-64	.171	.333	1.000	2.000	-
65-69	.056	.167	-	-	-
70-74	.217	-	-	-	-
75 & up	.279	.222	.800	-	-
All Drivers	.208	.505	.919	1.125	1.214

^{1/} Includes accident-connected convictions

- No data available

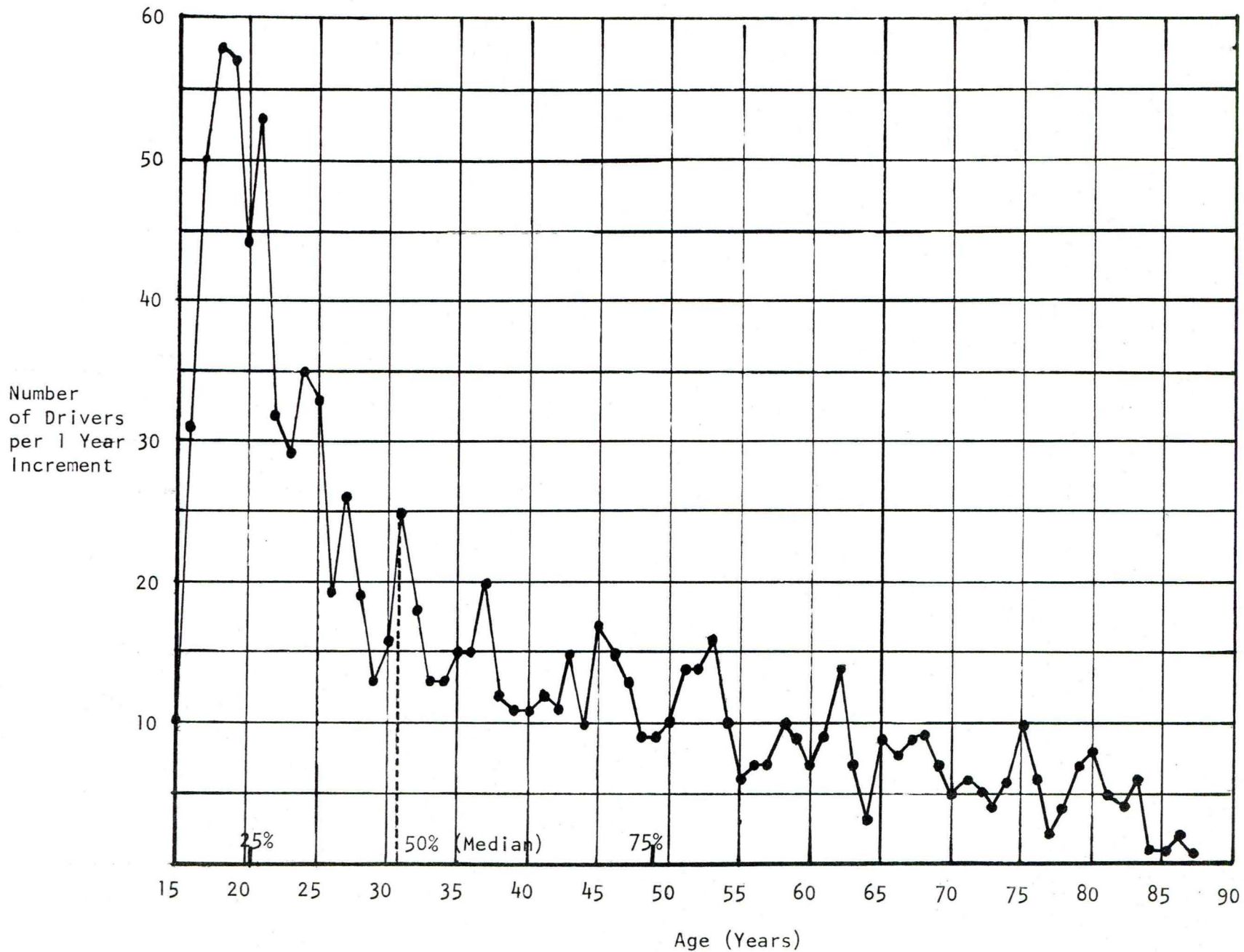


CHART 1: AGE DISTRIBUTION OF IOWA DRIVERS INVOLVED IN FATAL ACCIDENTS 1972

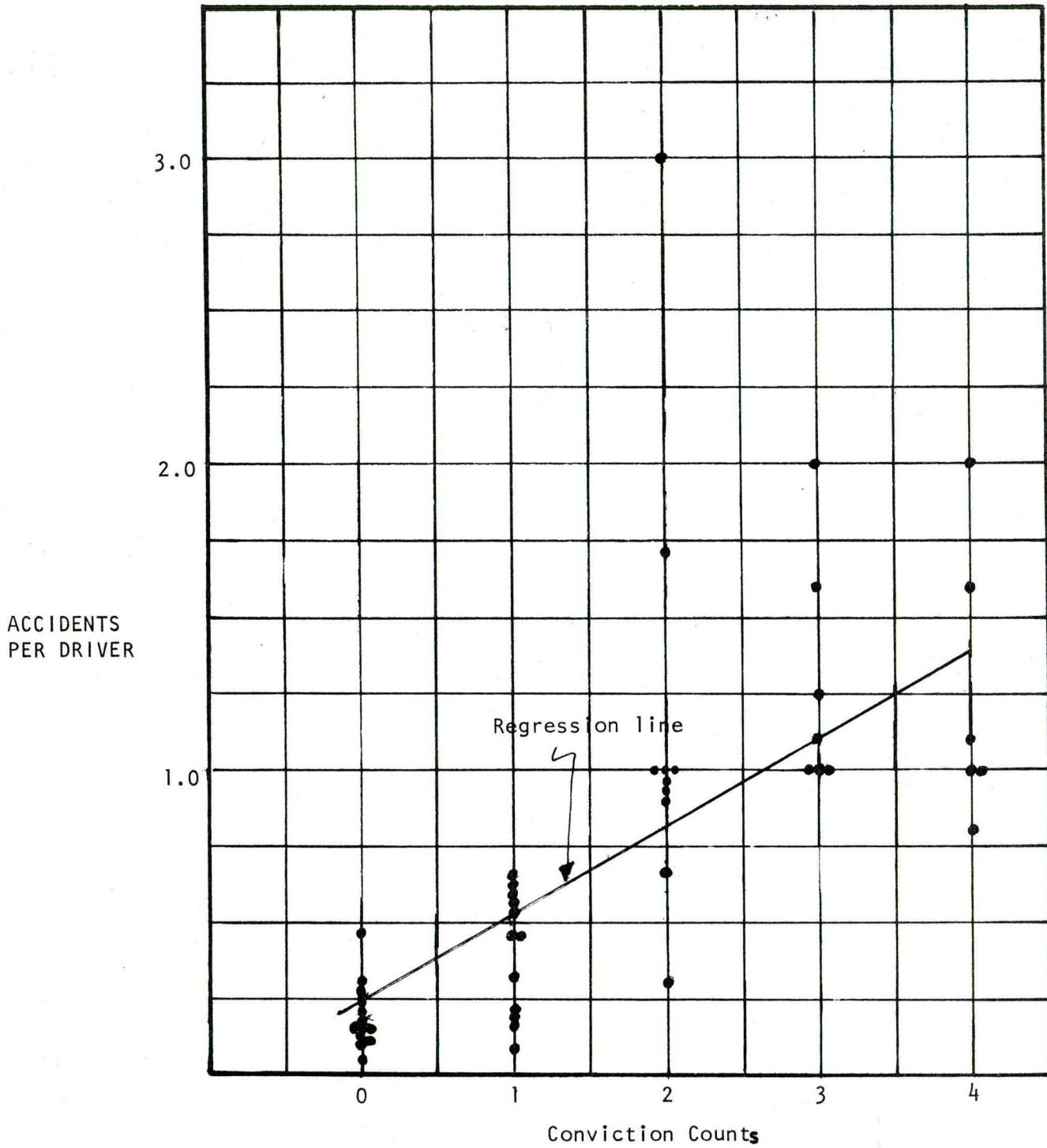


CHART 2: RELATIONSHIP BETWEEN CONVICTION COUNT AND ACCIDENTS PER DRIVER FOR DRIVERS INVOLVED IN FATAL TRAFFIC ACCIDENTS: IOWA, 1972 (Three years prior record)^{1/}

^{1/} Includes accident-connected convictions

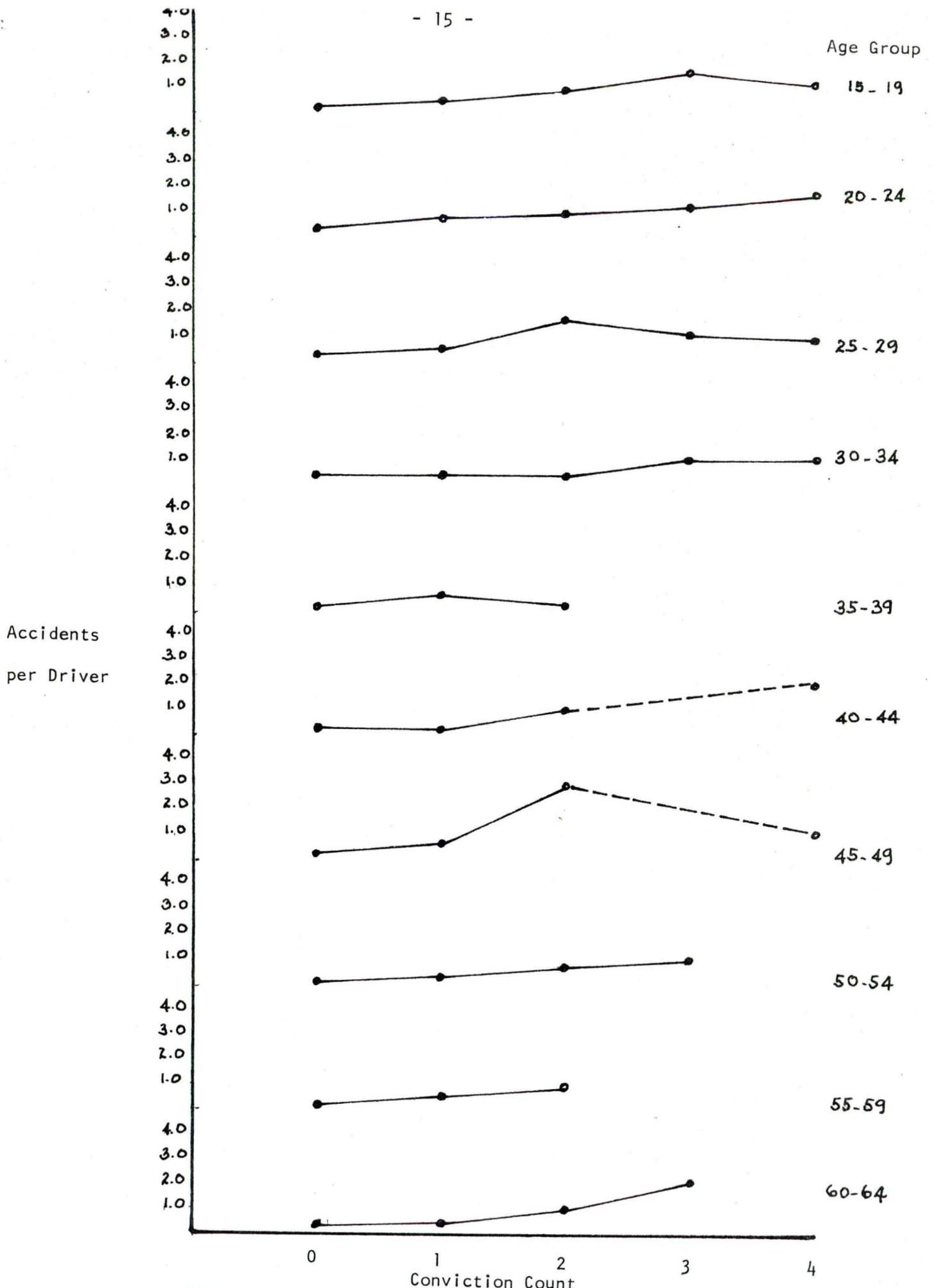


CHART 3: ACCIDENTS PER DRIVER AS A FUNCTION OF CONVICTION COUNT BY 5 YEAR AGE GROUP. IOWA 1971/7

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