

Comparison of Types of Traffic Violations For Different Years

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It is well known that the accident-reporting index varies considerably from area to area even within a given jurisdiction and from time to time. There is evidence that the reporting is done best in the more-highly populated areas and poorest in the sparsely populated areas. Before the passage of a financial responsibility law in Iowa the reporting index was shown by Lauer to vary considerably from year to year. Publicity programs also have a great deal to do with the accident reporting index in a given locality.

The National Safety Council has shown that there is a wide variation between states. The frequently quoted ratio of around 125 accidents per fatality is only an average found throughout the United States. It is conceivable that other factors may operate, notably the discharge of certain military groups, the incidence of the number of persons taken into the draft, seasonal variation, and travel due to vacations, football, etc.

The present study is a comparison of the violation and accident records in Iowa for two consecutive periods, 1948-50 and 1950-52. Two samplings of 7,692 drivers and 7,334 drivers were systematically drawn from the Iowa license files during these two periods. Comparisons are made on the basis of age and sex.

It was originally hypothesized that there might be a difference between these two periods from the effects of driver education, a larger patrol and other factors which might influence the incidence of violations or accidents during these periods. Tabular data will be given which show that differences between two 3-year periods are relatively minor and that high agreement is found in the general nature of the age curves for the two samples. A relative consistency in the nature of violations from year to year is indicated.

● IT has long been known that traffic accident and violation reports vary with the nature of financial responsibility laws, particular interest of the enforcement agencies at the moment, administration policies and other factors. For instance, Lauer (2, 3) has reported variations in traffic flow and speed characteristics of different age groups at different hours of the day. The greatest number of excessive speeds was noted at hours when the patrol was off duty.

McMurray and Lauer (6) have called attention to the variations in accident frequency from month to month and from season to season as reported by accident statistical bureaus. Frequently the fluctuations are chance variations.

It would appear that a study of accident trends from one year to another or from one period of years to another period, might be of considerable importance to traffic enforcement groups to guide strategy in reducing the total number of accidents and violations occurring during a given period.

Outside of purely local tendencies to step up the enforcement index when frequency of involvement becomes noticeable, there has been very little done in the way of scientific study on the relationship between violations and accidents. Likewise little has been done on variations in reporting of violations and accidents from one period of time to another.

Lauer (3) has studied the age at which violations occur. Siebrecht (7) in plotting the age of drivers at the time of their accidents, obtained curves which differed only slightly for successive trienniums. To all intent and purposes the differences could have been chance variations. A very definite pattern was established throughout the age range group.

Further, Siebrecht and Bennett (8) in reporting on the relationship between traffic violations and the kind of training drivers have received, found significant differences between the untrained and trained drivers with respect to the frequency and type of violations of the drivers.

PROBLEM AND PURPOSES OF THE PRESENT STUDY

The present study is an attempt to break down violations into type and number of arrests for each type. This has been done for each of two samplings of the population of drivers in Iowa taken in 1950 and 1953 respectively.

If we wish to state the problem in the form of a hypothesis we may use the null form and say that two samplings of accidents and violations taken for successive three-year periods do not differ significantly by type. A number of assumptions need be made regarding results obtained which are basic to the present study. These may be given as follows:

1. It is assumed that the accident files were kept in the same condition during the 1950-1-2 period that they were for the 1947-8-9 period. There is bound to be a lag in the removal of names of persons from the files of those who are not driving at a given time due to moving out of the state, marriage, etc. It may be further assumed that the number of delinquent licenses in the files was approximately the same for 1950-1-2 as it was for 1947-8-9.

2. Since there was no major change in the number of the highway patrolmen on the road during these two periods, the enforcement index is assumed to have remained approximately the same. The latter assumption is not strictly valid since in 1947 it was known that the drivers license responsibility law was going into effect and there was more emphasis made on securing complete records. However, an increase from \$25 to \$50 minimum damage required for a report would tend to offset this effect.

3. The number of drivers, cars registered, and mileage driven are increasing, however, and allowance should be taken of these factors.

With these assumptions and under conditions of the study to be described it would seem reasonable that the results might be used as an index to the number of accidents and types of violations which are likely to occur within the next three or more years providing no fundamental changes are made in the methods of enforcement, the amount of damage necessary for an accident to be reported and a fairly stable population of drivers of given ages. If for example, the older drivers should suddenly decrease the amount of driving they do and the younger persons increase their number and mileage driven, it is likely that a different set of values might be obtained.

If on the other hand the effects of driver education might notably stimulate the youthful drivers to be more careful and if policies and other methods may bring reduction in accidents among the older groups of drivers it is conceivable that the forms of the frequency curves might change.

From the standpoint of enforcement it would seem that this type of analysis might be periodically desirable in order that the public may be appraised of the facts regarding violation and accident trends. Too frequently the accident reporting bureaus merely indicate numbers of drivers having certain types of accidents or violations. The frequency of involvement is given without any statistical evaluation to show whether or not these differences are due to chance or whether they are real changes. Usually no basis of comparison, such as the number of drivers in an age group, are stated.

METHOD AND PROCEDURE

The present study is a statistical analysis of the types of violation occurring during two 3-year periods. Systematic sampling of the population of driver licenses in the files in 1950 was made by drawing every 200th card. This gave a total of 7,692 cases. By simple computation this would indicate that there were 1,592,400 licenses in the file at that time. Many of these licenses, however, belonged to service men or persons who had moved out of the state, were deceased, or otherwise had ceased driving. Consequently the sample shrank to some extent and in the present analysis there was no attempt made to utilize the complete 7,692 cases. For reasons given an N of 6,414 cases was used, for this study, both men and women.

The 1953 sampling was obtained by drawing every 250th card in a systematic manner. There were 7,334 licenses drawn. For reasons stated above, shrinkage resulted in an N of 5,437 cases used in this study. The authors assume that the shrinkage would be more or less uniform throughout the various age and sex groups, and consider the samp-

ling as representative of what was found in the files. By likewise making an estimate from this sampling it would seem that in 1953 there were close to 1,833,500 licenses for both sexes in the files.

According to the Bureau of Public Roads, Department of Commerce, quoted in the 1955 Pocket Almanac, Iowa had 1,336,214 licensed drivers in 1953. The authors are not in position to reconcile this discrepancy between the sampling and the quoted number of licenses but it is assumed that the difference would be accounted for partly by the number of inactive licenses in the files at the time. It is also possible that this estimate is based on an earlier figure which has grown considerably during the last several years due to the fact that many more women and younger people are being licensed today. At least as large or larger proportion of the male population is being licensed; hence it would be expected that the figures would grow with the increase in driving population.

It is estimated at the present that there are about 162,000,000 persons in the United States, whereas the 1950 census showed slightly over 150,000,000. The State of Iowa has not grown proportionately but the 1950 census showed 2,621,073 people in Iowa as against 2,500,000 in 1940. From the State Bureau of Vital Statistics' estimate most larger communities in Iowa have shown some increase since 1950 although the state population has not materially changed. Many smaller centers have lost slightly during the past 5 years.

RESULTS

Results of this study are presented in a number of tables which will be referred to in order. The tables have been numbered as follows: (1) Comparison of Total Violation Involvement of Men Drivers, (2) Comparison of Frequency of Violations by Types for Men Drivers, (3) Comparison of Total Violation and Accident Involvement of Men Drivers, (4) Comparison of Total Violation Involvement of Women Drivers, and (5) Comparison of Total Violation and Accident Involvement of Women Drivers. The statistical significance of differences between the two samples of drivers has been given when such was feasible to calculate.

Only comparisons of the total number of accidents and violations were made for women. The records of women were so sparse that it would not be representative and no test of significance could be made if broken down into the separate types of violations.

This study involved a grand total of 11,851 men and women drivers of motor vehicles in Iowa. Of this number 6,414 were included in the 1950 sample and 5,437 in the 1953 sample. Slightly more than seven of ten drivers in each sample were men.

Violation Involvement of Men Drivers

Almost the same percentages of the men drivers in each sample were found to be violators - 27.45 percent of the 1950 sample and 27.30 percent of the 1953 sample. When the two samples are compared with respect to the frequency of violations per driver involved - 0, 1, 2, 3, 4, or 5 or more violations - no statistically significant differences between the two samples were found. The nearest approach to significance occurred when the samples were compared with respect to drivers having three violations; the chi-square value of 3.574 is just under the 5 percent level of significance (see Table 1). The chi-square values of differences between the two samples for the various frequency of involvements are all given in Table 1.

According to the reporting system used by the Department of Public Safety in Iowa, drivers may be charged with one or more of thirteen specific violations. These include operating a motor vehicle while intoxicated (O. M. V. I.), speeding, improper parking, failure to yield the right of way, following too closely, improper passing, improper turning, backing, failure to signal, leaving the scene of an accident, failure to slow down for pedestrians, and "other violations."

When the two samples of male drivers were compared with respect to involvement in specific kind of violations, significant differences beyond the 1 percent level were obtained for violations of speeding and improper passing, and for the general category "other violations" (see Table 2). There were more than expected in both these categories for 1953.

The difference between the two samples with respect to the violation "failure to stop

TABLE 1
COMPARISON OF TOTAL VIOLATION INVOLVEMENT OF MEN DRIVERS
OF TWO SAMPLES

Men Drivers with No Violations

Sample	Involvement	Observed	Expected	O-E	(O-E) ²	(O-E) ² /E
1950	0 violations	3435	3438. 36760	- 3. 36760	11. 34072	. 00329
	Others	1300	1296. 63240	3. 36760	11. 34072	. 00874
1953	0 violations	2871	2867. 60584	3. 39416	11. 52032	. 00401
	Others	1078	1081. 39416	- 3. 39416	11. 52032	. 01065
					χ^2 --	. 02669

Men Drivers with One Violation

1950	1 violation	851	830. 99250	20. 00750	400. 30005	. 48171
	Others	3884	3904. 00750	-20. 00750	400. 30005	. 10253
1953	1 violation	673	693. 04950	-20. 04950	401. 98245	. 58001
	Others	3276	3255. 95050	20. 04950	401. 98245	. 12346
					χ^2 --	1. 28771

Men Drivers with Two Violations

1950	2 violations	254	256. 82640	- 2. 82640	7. 98853	. 03110
	Others	4481	4478. 17360	2. 82640	7. 98853	. 00178
1953	2 violations	217	214. 19376	2. 80624	7. 87429	. 03676
	Others	3732	3734. 80624	- 2. 80624	7. 87492	. 00210
					χ^2 --	. 07174

Men Drivers with Three Violations

1950	3 violations	100	113. 40325	-13. 40325	179. 64711	1. 58414
	Others	4635	4621. 59675	13. 40325	179. 64711	. 03887
1953	3 violations	108	94. 57855	13. 42145	180. 13532	1. 90461
	Others	3841	3854. 42145	-13. 42145	180. 13532	. 04673
					χ^2 --	3. 57435

Men Drivers with Four Violations or More

1950	4 or more viol.	95	95. 41025	- . 41025	. 16830	. 00176
	Others	4640	4639. 58975	. 41025	. 16830	. 00004
1953	4 or more viol.	80	79. 57235	. 42765	. 18288	. 00229
	Others	3869	3869. 42765	- . 42765	. 18288	. 00004
					χ^2 --	. 00413

for stop signs" falls slightly short of the 5 percent level. The differences for the remaining kinds of violations were non-significant by the χ^2 criterion. However, slight shifts in the frequency of violations of specific kinds were noted. Slightly larger percents of drivers in the 1953 sample were charged with speeding, improper passing, and failure to stop for stop signs, and approximately 3 percent fewer drivers charged with violations were found under the caption "other violations." This may reflect better cooperation on the part of the courts since the patrol may be able to make a specific charge hold better in recent months.

A third comparison made between the two samples of men drivers has to do with the frequency of both total violation and total accident involvements. The two samples were compared with respect to the following kinds of involvement: accidents only, violations only, both accidents and violations, and neither accidents or violations. Chi-square tests of significance show the differences between the two samples to be significant beyond the 1 percent level for all four comparisons (see Table 3).

Hence the null hypothesis of no difference between the two samples with respect to conditions studied was not sustained. The tendency was for male drivers in the 1950 sample to be more involved in violations and for those of the 1953 sample to be more

TABLE 2

COMPARISON OF FREQUENCY OF VIOLATIONS BY TYPES, MEN DRIVERS

Men Drivers Charged with OMVI (Operating Motor Vehicle while Intoxicated)

Sample	Involvement	Observed	Expected	O-E	(O-E) ²	(O-E) ² /E
1950	O. M. V. I.	160	146. 12210	13. 87790	192. 59610	1. 31804
	Others	4575	4588. 87790	-13. 87790	192. 59610	. 04197
1953	O. M. V. I.	108	121. 86614	-13. 86614	192. 26983	1. 57771
	Others	3841	3827. 13386	13. 86614	192. 26983	. 05023
		<u>8684</u>	<u>8684. 00000</u>		χ^2 ---	2. 98795
Men Drivers Charged with Speeding						
1950	Speeding	349	396. 93505	-47. 93505	2297. 76901	5. 78877
	Others	4386	4338. 06495	47. 93505	2297. 76901	. 52967
1953	Speeding	379	331. 04467	47. 95533	2299. 71367	6. 94683
	Others	3570	3617. 95533	-47. 95533	2299. 71367	. 63563
		<u>8684</u>	<u>8684. 00000</u>		χ^2 --	13. 90090 ^a
Men Drivers Charged with Improper Passing						
1950	Improper Passing	108	135. 23160	-27. 23160	741. 56003	5. 48362
	Others	4627	4599. 76840	27. 23160	741. 56003	. 16121
1953	Improper Passing	140	112. 78344	27. 21656	740. 74113	6. 56781
	Others	3809	3836. 21656	-27. 21656	740. 74113	. 19309
		<u>8684</u>	<u>8684. 00000</u>		χ^2 --	12. 40573 ^a
Men Drivers Charged with Failure to Stop at Stop Sign						
1950	Fail - Stop Sign	273	294. 42230	-21. 42230	458. 91493	1. 55869
	Others	4462	4440. 57770	21. 42230	458. 91493	. 10334
1953	Fail - Stop Sign	267	245. 54882	21. 45118	460. 12339	1. 87397
	Others	3682	3703. 45118	-21. 45118	460. 12339	. 12424
		<u>8684</u>	<u>8684. 00000</u>		χ^2 ---	3. 66024
Men Drivers Charged with Failure to Stop at Stop Light						
1950	Fail - Stop Light	52	58. 33520	- 6. 33520	40. 13475	. 68800
	Others	4683	4676. 66480	6. 33520	40. 13475	. 00858
1953	Fail - Stop Light	55	48. 65168	6. 34832	40. 30116	. 82836
	Others	3894	3900. 34832	- 6. 34832	40. 30116	. 01033
		<u>8684</u>	<u>8684. 00000</u>		χ^2 ---	1. 53527
Men Drivers Charged with "Other" Violations						
1950	"Other" viol.	678	617. 72810	60. 27190	3632. 70192	5. 88074
	Others	4057	4117. 27190	-60. 27190	3632. 70192	. 88230
1953	"Other" viol.	455	515. 18654	-60. 18654	3622. 41959	7. 03127
	Other	3494	3433. 81346	60. 18654	3622. 41959	1. 05492
		<u>8684</u>	<u>8684. 00000</u>		χ^2 ---	14. 84923 ^a
Men Drivers Charged with "Miscellaneous" Violations ^b						
1950	"Miscellaneous"	92	92. 66395	- .66395	. 44082	. 00475
	Others	4643	4642. 33605	. 66395	. 44082	. 00009
1953	"Miscellaneous"	78	77. 28193	. 71807	. 51562	. 00667
	Others	3871	3871. 71807	- .71807	. 51562	. 00013
		<u>8684</u>	<u>8684. 00000</u>		χ^2 ----	. 01164

^a Significant at 1 percent level^b Includes charges for: Improper parking, failure to have right of way, following too closely, improper turning, backing, failure to signal, leaving scene of accident, and failure to slow down for pedestrian.

TABLE 3
COMPARISONS OF TOTAL VIOLATION AND ACCIDENT INVOLVEMENT
OF MEN DRIVERS OF TWO SAMPLES

Men Drivers with "Accidents Only"

Sample	Involvement	Observed	Expected	O-E	(O-E) ²	(O-E) ² /E
1950	Accidents only	550	695.19270	-145.19270	21080.92013	30.32385
	Others	4185	4039.80730	145.19270	21880.92013	5.21829
1953	Accidents only	725	579.79218	145.20782	21085.31098	36.36701
	Others	3224	3369.20782	-145.20782	21085.31098	6.25823
		<u>8684</u>	<u>8684.00000</u>			χ^2 -- 78.16738 ^a

Men Drivers with "Violations Only"

1950	Violations only	779	703.90510	75.09490	5639.24400	8.01136
	Others	3956	4031.09490	-75.09490	5639.24400	1.39893
1953	Violations only	512	587.05834	-75.05834	5633.75440	9.59658
	Others	3437	3361.94166	75.05834	5633.75440	1.67575
		<u>8684</u>	<u>8684.00000</u>			χ^2 --- 20.68262 ^a

Men Drivers with "Both Violations and Accidents"

1950	Viol. & Accid.	521	592.72730	-71.72730	5144.80556	8.67988
	Others	4214	4142.27270	71.72730	5144.80556	1.24202
1953	Viol. & Accid.	566	494.33582	71.66428	5135.76902	10.38923
	Others	3383	3454.66418	-71.66428	5135.76902	1.48661
		<u>8684</u>	<u>8684.00000</u>			χ^2 --- 21.79774 ^a

Men Drivers with "Neither Violations nor Accidents"

1950	No Viol. or Accid.	2885	2743.17490	141.82510	20114.35899	7.33251
	Others	1850	1991.82510	-141.82510	20114.35899	10.09845
1953	No Viol. or Accid.	2146	2287.82366	-141.81366	20111.11416	8.79053
	Others	1803	1661.18634	141.81366	20111.11416	12.10647
		<u>8684</u>	<u>8684.00000</u>			χ^2 --- 38.32796 ^a

^a Significant beyond the 1 percent level.

involved in accidents. The percentage-wise trends of involvements are evident from the following summary:

Sample	No. of Drivers	Only Accidents	Only Violations	Both Accidents & Violations	Neither Accidents nor Violations
1950	4735	11.62	16.45	11.00	60.93
1953	3949	18.36	12.97	14.33	54.34

Whether these differences are real or an artifact due to enforcement policy cannot be easily determined.

Violation Involvement of Women Drivers

As stated earlier, three of ten drivers in each of the two samples were women drivers. The number of women drivers for the 1950 sample was 1,679 and for the 1953 sample, 1,488. In both of the samples less than 5 percent of the women drivers were charged with violations as compared with about 27 percent of the men drivers. A general characteristic of the women drivers in the two samples was the relatively low frequency of involvement in violations as well as accidents, thus making impossible any detailed analyses of specific violations similar to that made for men drivers due to the small number of cases in each category.

TABLE 4
COMPARISONS OF TOTAL VIOLATION INVOLVEMENT OF WOMEN DRIVERS
OF TWO SAMPLES

Women Drivers with No Violations

Sample	Involvement	Observed	Expected	O-E	(O-E) ²	(O-E) ² /E
1950	0 violations	1612	1605.30869	6.69131	44.77362	.02789
	Others	67	73.69131	-6.69131	44.77362	.60758
1953	0 violations	1416	1422.69168	-6.69168	44.77858	.03147
	Others	72	65.30832	6.69168	44.77858	.68564
		3167	3167.00000		x ² --	1.35258

Women Drivers with One Violation

1950	1 violation	58	64.67508	-6.67508	44.55669	.68893
	Others	1621	1614.32492	6.67508	44.55669	.02760
1953	1 violation	64	57.31776	6.68224	44.65233	.77903
	Others	1424	1430.68224	-6.68224	44.65233	.03121
		3167	3167.00000		x ² --	1.52677

Women Drivers with Two Violations or More

1950	2 or more viol.	9	9.01623	-.01623	.00026	.00003
	Others	1670	1669.98377	.01623	.00026	.00000
1953	2 or more viol.	8	7.99056	.00944	.00008	.00001
	Others	1480	1480.00944	-.00944	.00008	.00000
		3167	3167.00000		x ² ---	.00004

TABLE 5

COMPARISONS OF TOTAL VIOLATION AND ACCIDENT INVOLVEMENT
OF WOMEN DRIVERS IN TWO SAMPLES

Women Drivers with "Accidents Only"

Sample	Involvement	Observed	Expected	O-E	(O-E) ²	(O-E) ² /E
1950	Accidents only	78	111.33449	-33.33449	1111.18822	9.98062
	Others	1601	1567.66551	33.33449	1111.18822	.70881
1953	Accidents only	132	98.66928	33.33072	1110.93689	11.25919
	Others	1356	1389.33072	-33.33072	1110.93689	.79962
		3167	3167.00000		x ² --	22.74824 ^a

Women Drivers with "Violations Only"

1950	Violations only	49	52.48554	-3.48554	12.14898	.23147
	Others	1630	1626.51446	3.48554	12.14898	.00746
1953	Violations only	50	46.51488	3.48512	12.14606	.26112
	Others	1438	1441.48512	-3.48512	12.14606	.00842
		3167	3167.00000		x ² ---	.50847

Women Drivers with "Both Violations and Accidents"

1950	Viol. & Accid.	18	21.20577	-3.20577	10.27696	.48463
	Others	1661	1657.79423	3.20577	10.27696	.00619
1953	Viol. & Accid.	22	18.79344	3.20656	10.28202	.54710
	Others	1466	1469.20656	-3.20656	10.28202	.00699
		3167	3167.00000		x ² ---	1.04491

Women Drivers with "Neither Violations nor Accidents"

1950	No Viol. nor Accid.	1534	1493.97420	40.03580	1602.06466	1.07235
	Others	145	185.02580	-40.03580	1602.06466	8.65860
1953	No Viol. nor Accid.	1284	1324.02240	-40.02240	1601.79250	1.20979
	Others	204	163.97760	40.02240	1601.79250	9.76836
		3167	3167.00000		x ² --	20.70910 ^a

^a Significant beyond 1 percent level.

When the women drivers were compared with respect to the frequency of violations — 0, 1, 2 or more — no significant differences were found (see Table 4). The majority of the women drivers involved were charged with a single violation only.

Like the men drivers, the women drivers of the two samples were compared with respect to both violation and accident involvement under the following four conditions: accidents only, violations only, both accidents and violations, and neither accidents nor violations (see Table 5).

Differences between the drivers of the two samples were found to be significant beyond the 1 percent level with respect to involvement in "accidents only" and "neither accidents nor violations." No significant differences were found with respect to involvement in "violations only" and "both accidents and violations." Percentage-wise, the trend of involvement of the women drivers of the two samples with respect to the four conditions is given in the following summary:

Sample	No. of Drivers	Only Accidents	Only Violations	Both Accidents & Violations	Neither Accidents nor Violations
1950	1679	4.65	2.92	1.07	91.36
1953	1488	8.77	3.36	1.48	86.29

SUMMARY AND CONCLUSIONS

This study is concerned with the violation and accident involvement of two samples each of men and women drivers of motor vehicles in the State of Iowa. Included in the samples were 11,851 cases, 6,414 in the 1950 sample and 5,437 in the 1953 sample. About seven of ten drivers were men. The two samples were compared with respect to violations and accidents and tests of significance were computed where possible to do so.

Within the limits of the study, the samples used and other limitations of the study, the following conclusions are offered:

1. The null hypothesis of no significant difference between the drivers of the two samples with respect to records of total violation involvement was sustained. No significant differences were found between either the men or the women drivers when they were compared with respect to frequency of violations, that is, 0, 1, 2, 3, etc. violations. This seems to hold notwithstanding the fact that there were more cars, more drivers and greater mileage driven in 1953. Several implications may be made which will not be elaborated here.
2. When the two samples were compared with respect to records of involvement in specific kinds of violations, significant differences beyond the 1 percent level were obtained between the men drivers of the two samples for speeding and improper passing. None of the differences between drivers involved in the remaining specific violations were significant. Because of the meager records similar comparisons for the women drivers of the two samples were not possible.
3. When the two samples were compared with respect to violations and accidents, differences significant beyond the 1 percent level were found between the men drivers for the following involvements: accidents only, violations only, both violations and accidents, and neither violations nor accidents. For the women drivers of the two samples, significant differences beyond the 1 percent level were found for involvement in "accidents only" and for "neither accidents nor violations." No significant differences were found for "violations only" and "both accidents and violations" involvement.
4. It is noteworthy that certain types of violations stated on the form are rarely, if ever, used. It might be worthwhile to consider the advisability of dropping them if there is no occasion for enforcement.
5. It is quite generally agreed that the quickest method of securing conformity with traffic ordinances is by strict enforcement. Thus a periodic comparison and evaluation of the records should be of considerable use to enforcement agencies. It appears that keeping the enforcement index at the most effective level is highly desirable. Further implications will not be discussed here.
6. The technique used in this study might well be applied to the evaluation of efficiency in patrol districts or other geographical areas of distribution. It would provide a

more precise measuring instrument than has been conventionally used for such purpose by enforcement agencies and traffic engineers.

7. There seemed a slight tendency for women to have more accidents against their records in 1953. Whether this is real, or merely a reflection of enforcement policy is not known.

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