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EVALUATION OF NEW YORK STATE'S MANDATORY OCCUPANT RESTRAINT LAW

Volume V: Fatalities and Injuries Among Motor Vehicle Occupants Covered by the Law

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16. Abstract

The report focuses on the ultimate measure of the effectiveness of New York State's Mandatory Occupant Restraint Law: reductions in fatalities and serious injuries among vehicle occupants. All front seat occupants and children under the age of ten, regardless of seating position, are covered by the law.

The purpose of the analyses was to determine whether the pattern of injuries and fatalities sustained by these occupants in 1985, the first year of the law's implementation, differed from a baseline period prior to the law. Based on a comparison of the 1985 actual injury/fatality pattern with the pattern that would have been expected without the law, it is estimated that 220 fewer persons were killed in 1985. In addition, approximately 3,500 fewer occupants sustained serious injuries, 11,400 fewer occupants sustained moderate injuries, and 470 fewer occupants received minor injuries, while the number of uninjured occupants increased by 15,600.

Analyses of the data further indicated that the general pattern of savings found for occupants statewide also occurred during each quarter of the year, within each region of the State, for both men and women, for each age group, and for occupants in each seating position. Variations in the size and pattern of savings were noted.

Due to the imprecision of the injury classification scheme and the lack of reliable data on restraint use among accident victims, the savings in lives and injuries could only be estimated. However, the estimated savings in fatalities were comparable to those anticipated, based on the estimated effectiveness of safety belts and usage prior to and after implementation of New York's Mandatory Occupant Restraint Law.

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EXECUTIVE SUMMARY

New York State's Mandatory Occupant Restraint Law was implemented on December 1, 1984. Full enforcement of the law began on January 1, 1985. This report focuses on the ultimate measure of the effectiveness of the law: reductions in fatalities and serious injuries sustained by vehicle occupants. The report represents the first detailed analyses of accidents involving occupants covered by the law, that is, all front seat occupants and children under the age of ten, regardless of seating position.

The purpose of the analyses was to determine whether the pattern of injuries and fatalities sustained by these occupants in 1985, the first year of the law's implementation, differed from a two-year baseline period prior to the law.

An effective restraint use law should produce a reduction in serious injuries and fatalities sustained by vehicle occupants involved in accidents, given a constant level of accidents. An important concern in planning the analyses, however, was the fact that the total vehicle miles travelled in New York State and the total reportable accidents increased substantially from 1982 to 1985. In order to control for these increases, an analysis plan was developed that viewed any changes in fatalities and injuries as changes in the proportion of total occupants killed, injured or uninjured. To translate any changes in these proportions into savings of persons injured or killed, the baseline proportions and the total number of occupants involved in accidents in 1985 were used to derive the number of occupants in each fatality/injury category that would have been expected in 1985 without the law. The difference between the expected and actual number of occupants in each category represented the savings assumed to be attributable to the effects of the law.

Comparisons between the baseline and post-law periods were made for five categories of accident outcomes:

Fatalities

"A" or serious injuries

"B" or moderate injuries

"C" or minor injuries

Persons uninjured

RESULTS OF ANALYSES

The results of these comparisons at the statewide level indicated that the Mandatory Occupant Restraint Law produced substantial savings in 1985. If the fatality/injury pattern in 1985 had followed the baseline pattern, approximately 220 more occupants would have been killed, 3,500 more occupants would have received an A injury, 11,400 occupants would have sustained a B injury, and 470 more occupants would have sustained a C injury. A total of 15,600 fewer occupants were injured than would have been expected. These savings represent reductions of 18 percent in fatalities, 19 percent in A injuries, 21 percent in B injuries, and less than one percent in C injuries. The number of uninjured occupants was six percent higher than the expected number.

The data were also analyzed for the three regions of the State: New York City, Long Island and Upstate. Analyses of the expected and actual totals for the post-law period indicated that all three regions experienced substantial decreases in the number of fatalities and serious injuries and increases in the number of uninjured occupants. While the configuration of changes in the Long Island and Upstate regions was very similar, the shifts in the pattern of injuries and fatalities in New York City differed from the other two regions. The percentage decrease in actual fatalities from

the expected totals was much higher in New York City than in the other two regions. Fatalities declined 11 percent Upstate, 40 percent in New York City, and nine percent on Long Island. The three regions experienced similar savings in A and B injuries. When the expected and actual totals were compared for these two categories combined, the decreases were 19 percent in the Long Island and Upstate regions and 22 percent in New York City. Finally, while the proportion of C injuries increased marginally in the Upstate and Long Island regions, the number of C injuries in New York City in 1985 was seven percent lower than the expected total. Some of the differences between New York City and the rest of the State may be attributable to differences in the vehicle mix, average speed, and other variables that affect the nature of crashes.

In addition to an examination of fatality/injury changes at the statewide and regional levels, the data were analyzed by several variables. These analyses indicated that the savings found for all occupants statewide and within the three regions also generally occurred during each quarter of the year, for both men and women, for each age group, and for occupants in each seating position. While variations in the precise nature of the changes were found, all groups experienced large savings.

DISCUSSION

The savings in lives and injuries identified in these analyses could only be estimated. Two major limitations in the data that affected the research design and the results were the inherent imprecisions in the injury classification system and the absence of reliable data on restraint use among accident victims.

Since it is impossible to know to what extent restraint use among accident victims increased and, therefore, to identify more specifically the effects of the law, some portion of the savings estimated for 1985 may be attributable to other factors. However, the research design sought to mitigate the effects of the major complicating factors: the implementation of other major traffic safety programs and increases in vehicle miles travelled and the total number of accidents.

The estimated 1985 savings in fatalities among front seat occupants were comparable to the savings that were anticipated. Based on the statewide usage rates measured in roadside surveys (16% baseline, 55% post-law) and the predicted effectiveness of occupant restraints in preventing deaths (45%), a 19 percent reduction in fatalities would have been anticipated. Based on the analyses in this report, there was an estimated 18 percent reduction in fatalities among front seat occupants. It should be noted that the average baseline usage rate may have been lower than 16 percent, since publicity surrounding the passage of the law may have resulted in increased usage prior to the law's actual implementation. Using this formula, a lower pre-law rate would produce a larger anticipated reduction. The analyses presented in this report, however, did not focus exclusively, or even primarily, on reductions in fatalities. The mitigation and prevention of injuries also represent an important benefit of safety belt laws.

This report represents the first major analysis of New York State injury and fatality experience under mandatory occupant restraint legislation. Further analyses of 1986 accident data will indicate whether the variations in the size and pattern of injuries by region, age and gender found in 1985 are sustained over time. These results will be important to New York and other states in determining where the greatest benefits of mandatory restraint use laws can be expected.

1. INTRODUCTION

BACKGROUND OF THE LAW

For many years New York State has been a leader in promoting the use of safety restraints as an important measure for improving highway safety. In working toward the goal of restraint use by all vehicle occupants, traffic safety proponents in New York State adopted an incremental approach.

In the early 1960s, prior to the 1966 federal mandate, New York required that all new automobiles sold in the State be equipped with safety belts. In 1982, a principal recommendation of the Governor's Task Force on Alcohol and Highway Safety was the implementation of mandatory occupant restraint legislation. Mandated safety restraint use was cited as the most cost-effective means of protecting all vehicle occupants involved in traffic accidents.

In April 1982, New York State implemented one of the strictest child restraint laws in the nation. Since that time, restraint use has been required for all children under the age of five. Children under four years of age must be restrained in federally-approved child restraint devices. The law allowed for the substitution of safety belts for children between the ages of four and five. In April 1984, New York State enacted legislation that expanded mandatory restraint use to children under the age of seven and provided that the requirement be extended by 1987 to all children under ten years of age.

In the early 1980s, New York State also began to require mandatory restraint use by certain categories of drivers. In March 1983, drivers with learner permits were required by the Commissioner of Motor Vehicles to use safety restraints. Early in the 1984 Legislative session, a law was passed that required drivers with probationary licenses to buckle up, beginning in September 1984.

In the early summer of 1984, this incremental approach culminated with New York becoming the first state to enact a comprehensive mandatory occupant restraint law covering adults and children. Since December 1, 1984, all front seat occupants and children under the age of ten, regardless of seating position, have been required to use safety restraints. The law exempts the occupants of trucks weighing over 18,000 pounds, emergency vehicles, taxis, buses, and vehicles that pre-date the safety belt installation requirement. After a one-month warning period, full enforcement of the law began on January 1, 1985.

EVALUATION OF THE LAW

Both Federal and State officials recognized the importance of a comprehensive evaluation of the effectiveness of the nation's first Mandatory Occupant Restraint Law. The Institute for Traffic Safety Management and Research, in cooperation with the National Highway Traffic Safety Administration and the New York State Governor's Traffic Safety Committee, developed a four-part evaluation plan to assess the effects of the law on:

1) observed safety restraint use by front seat occupants and children under ten years of age;
2) attitudes, behaviors and perceptions of licensed drivers;
3) enforcement and convictions for violations;
4) fatalities and injuries to occupants of vehicles involved in traffic accidents.

ANALYSES OF FATALITIES AND INJURIES

The most important measure of the effectiveness of New York State's Mandatory Occupant Restraint Law is its impact on the number of fatalities and injuries that result from traffic accidents. This report presents the results of analyses of data relating to fatalities and injuries among those occupants involved in traffic accidents who were covered by the law. To determine the impact of the law, the fatalities and injuries that occurred during 1985, the first year the law was in effect, were compared to incidents during the pre-law period.

The second chapter of this report discusses the data and the methodology used in the study. Chapter 3 presents the analyses of accident data involving vehicle occupants covered by the law. Pre- and post-law patterns at the statewide level are presented. The statewide data are then examined to identify any variation in the patterns of injury by the time of the year, the region of the State, or the gender, age or seating position of the occupants. A final discussion of the results appears in Chapter 4.

2. DESCRIPTION OF DATA AND ANALYSIS PLAN

The most important measure of the effectiveness of New York State's Mandatory Occupant Restraint Law is its impact on the number of fatalities and injuries resulting from traffic accidents. If the law has been effective, then a downward shift in the number of serious injuries and fatalities sustained by occupants covered by the law would be expected. Specifically, given a constant level of accidents, fewer people should be killed or injured, and the injuries sustained should be less severe. The law should have no effect on the total number of accidents, although a number of other variables may affect the accident totals.

To test the hypothesis that the Mandatory Occupant Restraint Law caused a savings in fatalities and injuries, analyses of accident data were conducted to identify any changes in the pattern of deaths and injuries occurring prior to and following the implementation of the law. The data and the methodology employed in these analyses are described in this chapter.

DATA SOURCES

All of the data used in this report were obtained from the automated accident file maintained by the New York State Department of Motor Vehicles. This file contains a variety of information on property damage and personal injury accidents occurring in New York State. The information is submitted by law enforcement officers and motorists to the Department of Motor Vehicles.

Section 605 of the New York State Vehicle and Traffic Law states that a police officer must report to the Department of Motor Vehicles any accident resulting in a personal injury or death. Copies of the Police Accident Report and the coding sheet used by police officers to complete the Accident Report follow as Exhibits 2.1 and 2.2. The investigating

POLICE ACCIDENT REPORT

DMV COPY

EXHIBIT 2.1

Page ____ of ____ Pages

Local Codes

ACCIDENT DATE MO / DA / YR	DAY OF WEEK	TIME ☐AM ☐PM	NUMBER OF VEHICLES	NO. INJURED	NO. KILLED	NON-HIGHWAY ☐	NOT INVESTIGATED AT SCENE ☐	LEFT SCENE ☐	POLICE PHOTOS YES ☐ NO ☐

VEHICLE 1

LAST NAME DRIVER 1 | FIRST NAME | MIDDLE INITIAL

NUMBER AND STREET

CITY | STATE | ZIP CODE

DATE OF BIRTH MO / DA / YR	SEX	UNLICENSED ☐	NUMBER OF OCCUPANTS	PUBLIC PROPERTY DAMAGED ☐	DMV USE

LAST NAME OWNER 1 | FIRST NAME | MIDDLE INITIAL

NUMBER AND STREET

CITY | STATE | ZIP CODE

PLATE NUMBER	STATE OF REG.	YEAR & VEHICLE MAKE	VEHICLE TYPE	INS. CODE

VEHICLE 2

LAST NAME DRIVER 2 | FIRST NAME | MIDDLE INITIAL

NUMBER AND STREET

CITY | STATE | ZIP CODE

DATE OF BIRTH MO / DA / YR	SEX	UNLICENSED ☐	NUMBER OF OCCUPANTS	PUBLIC PROPERTY DAMAGED ☐	DMV USE

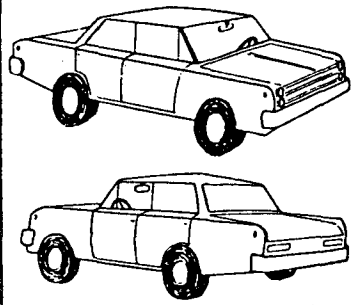
LAST NAME OWNER 2 | FIRST NAME | MIDDLE INITIAL

NUMBER AND STREET

CITY | STATE | ZIP CODE

PLATE NUMBER	STATE OF REG.	YEAR & VEHICLE MAKE	VEHICLE TYPE	INS. CODE

VEHICLE 1 DAMAGE



NO DAMAGE ☐ UNDERCARRIAGE ☐

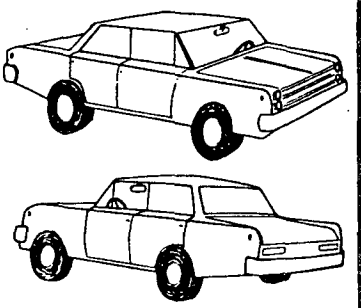
ACCIDENT DIAGRAM

1. REAR END | 3. LEFT TURN | 4. INTERSECTION | 5. RIGHT TURN | 7. HEAD ON

2. OVERTAKING | 0. LEFT TURN | 6. RIGHT TURN | 8. SIDESWIPE

9.

VEHICLE 2 DAMAGE



NO DAMAGE ☐ UNDERCARRIAGE ☐

VEHICLE BY TOWED TO

VEHICLE BY TOWED TO

REFERENCE MARKER	COUNTY	☐CITY ☐TOWN ☐VILLAGE OF	LANDMARKS AT SCENE

ROUTE NO. OR STREET NAME — ON

____ ☐MILES ☐FEET ☐N ☐S ☐E ☐W OF ROUTE NO. OR STREET NAME

☐AT INTERSECTION WITH

TICKET/ARREST — OPR 1 ☐ OPR 2 ☐ PEDESTRIAN ☐ OTHER ☐

TICKET/ARREST NUMBER(S)

VIOLATION SECTION(S)

ACCIDENT DESCRIPTION/OFFICER'S NOTES

USE COVER SHEET **D**

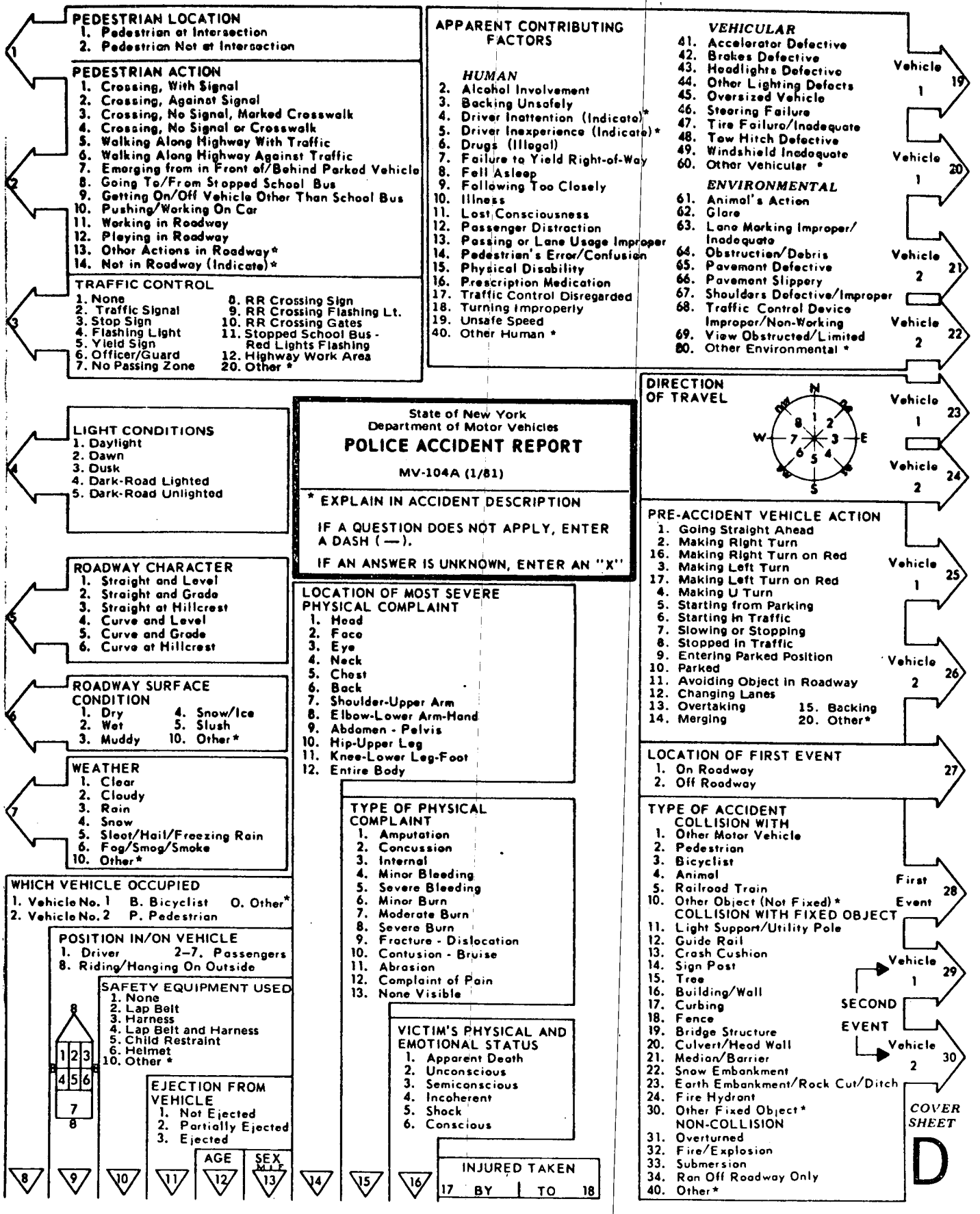
ALL INVOLVED

	8	9	10	11	12	13	14	15	16	17	18	NAMES - IF DECEASED GIVE DATE OF DEATH
A												
B												
C												
D												
E												
F												
G												

SIGN HERE	OFFICER'S RANK AND NAME	BADGE NO.	DEPARTMENT	PRECINCT/POST TROOP/ZONE	STATION/ BEAT/SECTOR	REVIEWING OFFICER	DATE/TIME REVIEWED
		11					

EXHIBIT 2.2

POLICE ACCIDENT REPORT CODING SHEET



officer provides three data items describing an injury sustained by any of the vehicle occupants: the location of the most severe physical complaint, the type of physical complaint, and the victim's physical and emotional status. The information is based on the officer's own observations, the motorist's account, and, in a few cases, the reports of medical personnel at the scene of the accident or the hospital. When the data from the form have been entered into the computerized accident file at the Department of Motor Vehicles, the three injury data items are converted by a computer program into one of the following three injury categories:

1) "A" injuries, including severe lacerations, broken or distorted limbs, skull fractures, crushed chest, internal injuries, being unconscious when taken from the accident scene, inability to leave the accident scene without assistance;
2) "B" injuries, including lump on head, abrasions, minor lacerations;
3) "C" injuries, including momentary unconsciousness, limping, nausea, complaint of pain without visible injury.

The Department of Motor Vehicles is notified of the death of a motorist by the New York State Department of Health. This information is based on death certificates sent to the Department of Health. If the death occurred within 30 days of the accident, the accident record is modified to record the outcome as death.

Accidents involving only property damage must be reported by the drivers involved if the amount of the damage to the vehicle exceeds $600. In this study the data on property damage accidents include only "reportable" accidents involving damage above the required reporting level. Prior to September 1, 1985, the required reporting level was $400 in property damage. Although enforcement personnel are not required to file

reports on accidents involving only property damage, the Department of Motor Vehicles usually receives an accident report from both the investigating police officer and the motorist. In all cases, the police report, if available, is used for entry into the accident file. Thus, the majority of accident records in the Department of Motor Vehicles' accident file are police-reported accidents.

DATA LIMITATIONS

In planning the analyses, certain limitations in the data had to be considered. The first limitation concerned the information on restraint use by occupants involved in accidents. This information may be reported by the motorist or by the investigating officer but is usually based on the motorist's account of the accident and, therefore, is not considered reliable. Furthermore, the level of reliability has probably been inconsistent. It is assumed that motorists were more likely to state that they were using a safety restraint after the failure to use a safety restraint constituted a violation of the law. The reporting is also very incomplete. In 1985, for example, information on restraint use was provided for only 79 percent of the occupants involved in police-reported accidents. For these reasons, the analyses used to measure the effects of the law were not based on data relating to reported restraint use in accidents.

A second limitation concerned the change in the requirements for reporting a property damage accident. As of September 1, 1985, the minimum amount of property damage that must be reported to the Department of Motor Vehicles was increased from $400 to $600. As was previously explained, one measure of the effectiveness of the safety belt law is an increase in the proportion of accidents that do not result in a personal injury. The

change in this reporting requirement means that the positive effects of the law will probably be understated because there should have been a decrease in the number of reported property damage accidents after September 1, 1985.

A final, important limitation of the data was that during 1983 the Department of Motor Vehicles did not enter any data on uninjured occupants into the computerized accident file. This deficiency was perhaps the most significant because it had major implications for the selection of a baseline period.

The post-law data in this study consist of accidents occurring in 1985, the first year of the law's full implementation. The baseline data consist of accidents occurring in 1982 and 1984. The first reason for choosing this baseline period was to avoid the contaminating effects of the New York State STOP-DWI Program. The STOP-DWI Program, which has been in effect since November 28, 1981, represented a major statewide initiative to curb drinking and driving. An evaluation of this program, conducted by the Institute for Traffic Safety Management and Research, found that STOP-DWI caused an immediate, significant decrease in personal injury and fatal accidents. The positive effects of STOP-DWI were evident in the accident data as early as December 1981. Between 1982 and 1985 there were no other traffic safety programs or legislation implemented that would have significantly affected statewide fatality and injury patterns.

As previously mentioned, 1983 data were not available for the occupants who were uninjured after involvement in a traffic crash. Since identifying any changes among the uninjured occupants was a major part of the analyses planned, it was necessary to exclude all 1983 data from the baseline. An additional justification for this decision was that the 1983 data on fatal and non-fatal injuries were similar to the data for 1982 and 1984. (Table 2.1)

TABLE 2.1

PERSONS INJURED IN TRAFFIC ACCIDENTS

	1982	1983	1984
Fatalities	2,147	2,077	2,064
A Injuries	28,503	27,910	28,208
B Injuries	76,453	74,724	76,057
C Injuries	148,003	148,679	162,094
Total	255,106	253,390	268,423

To conduct the analyses, monthly statewide data for the baseline and post-law periods were obtained for the following accident series:

1) Fatalities and injuries for occupants covered by the law;
2) Fatalities and injuries by sex, age and region for occupants covered by the law;
3) Fatalities and injuries by seating position for all occupants in vehicles covered by the law.

ANALYSES

The primary focus of the analyses was the accident experience of occupants covered by the law, that is 1) drivers and front seat passengers in vehicles covered by the law, and 2) persons under ten years of age in these vehicles, regardless of seating position. The analyses sought to identify any changes between the pre-law and post-law periods in:

Persons killed

Persons sustaining A injuries

Persons sustaining B injuries

Persons sustaining C injuries

Persons not injured

An important consideration in planning the analyses was the need to control for any changes in the total number of accidents and the occupants involved in these accidents. This was especially critical, since the total vehicle miles travelled in New York State rose from 80.4 billion miles in 1982 to 90.5 billion miles in 1985, and total reportable accidents rose from 268,959 in 1982 to 292,804 in 1985. To control for these increases, each fatality/injury series was viewed as a proportion of the total occupants covered by the law and involved in accidents.

The analyses involved a comparison of the baseline and post-law proportions for each series. If the law was effective in 1985, one would expect to see a decrease in the proportion of fatalities and serious injuries and an increase in the proportion of uninjured persons. The nature of any changes in the proportion of minor injuries is difficult to predict, since a safety restraint may prevent an injury that would have been minor or mitigate the severity of an injury.

The assumption made in these tables is that the baseline pattern of injuries reflected the hypothetical "true" pattern in the absence of the law. Given this assumption, the baseline proportions and the total number of occupants involved in accidents in 1985 were used to derive the number of occupants in each fatality/injury category that would have been expected in 1985 without the law. The numerical difference between the expected and actual totals was then computed, and this difference was then used to derive a percentage change from the expected total.

It should be noted that the baseline totals in all of the tables in this report represent the mean of the two baseline years 1982 and 1984. The accident patterns in these two years were similar, and the baseline annual mean totals provide a reasonable and understandable basis for comparison with the 1985 totals.

In addition to analyses of annual statewide data involving all occupants covered by the law, the data were also analyzed for the four quarters of the year, the regions of the State, and the gender and age of the occupants. Finally, the data for all occupants of vehicles covered by the law were analyzed by seating position.

For the regional analyses, the 62 counties of the State were grouped into three regions. New York City comprised one region and included the highly urbanized counties of the Bronx, Kings (the Borough of Brooklyn), New York (the Borough of Manhattan), Queens, and Richmond (the Borough of Staten Island). A second region, "Long Island," was composed of Nassau and Suffolk Counties. These two heavily populated counties, located on Long Island, New York, differ in many significant respects from New York City and the rest of the State. The remaining 55 counties in the State formed the third "Upstate" region.

The following age categories were used in the analysis: 0-3 years, 4-6 years, 7-9 years, 10-15 years, 16-24 years, 25-44 years, 45-54 years, 55-64 years, and 65 years and older. The age categories for children reflect the categories established under the provisions of the safety restraint use laws relating to children. The current law specifies that 1) children under the age of four must be in a federally-approved child safety seat, and 2) other children under the age of ten must use safety restraints. The data for the age group of 4-9 years were further separated into two categories of 4-6 years and 7-9 years, because children under the age of seven had been covered by a child restraint law in New York State prior to the implementation of the Mandatory Occupant Restraint Law.

3. ANALYSES OF FATALITIES AND INJURIES SUSTAINED BY VEHICLE OCCUPANTS INVOLVED IN ACCIDENTS

This chapter presents the analyses of fatality and injury data involving vehicle occupants covered by New York State's Mandatory Occupant Restraint Law. Statewide data are presented for 1985, the first year of the law's implementation, and a baseline period of 1982 and 1984. Using these same baseline and post-law periods, the data are also presented for the four quarters of the year, the three regions of the State, and the gender and age of the occupants. The final set of analyses looks at injury patterns among the occupants of all vehicles covered by the law, including an analysis of injuries and fatalities by the seating position of the occupants.

STATEWIDE FATALITIES AND INJURIES

Table 3.1 provides data on the outcomes of accidents involving occupants covered by the law for the baseline period and 1985. The baseline total represents the mean of the annual totals for 1982 and 1984. In addition to the total number of persons within each category, the table provides the proportion of total occupants falling within each category for the baseline period.

Assuming that the safety belt law had no effect on the number of occupants involved in accidents and that the 1982/1984 injury pattern was a typical one, the baseline proportions were applied to the total occupants in 1985 to derive the number of occupants in each category that would have been expected without the intervention of the law. Table 3.1 presents the expected totals, the actual totals, and the numerical and percentage differences between the expected and actual totals.

If the injury pattern in 1985 had followed the baseline pattern, it is expected that 220 more occupants would have been killed, 3,469 more occupants would have received an A injury, 11,441 more occupants would have sustained a B injury, and 469 more occupants would have sustained a C injury. A total of 15,599 fewer occupants were injured than would have been expected. When the differences between the expected and actual frequencies were subjected to a test of significance using the chi square statistic, the overall changes were statistically significant at the .01 level.

TABLE 3.1

STATEWIDE FATALITIES AND INJURIES
FOR OCCUPANTS COVERED BY THE LAW

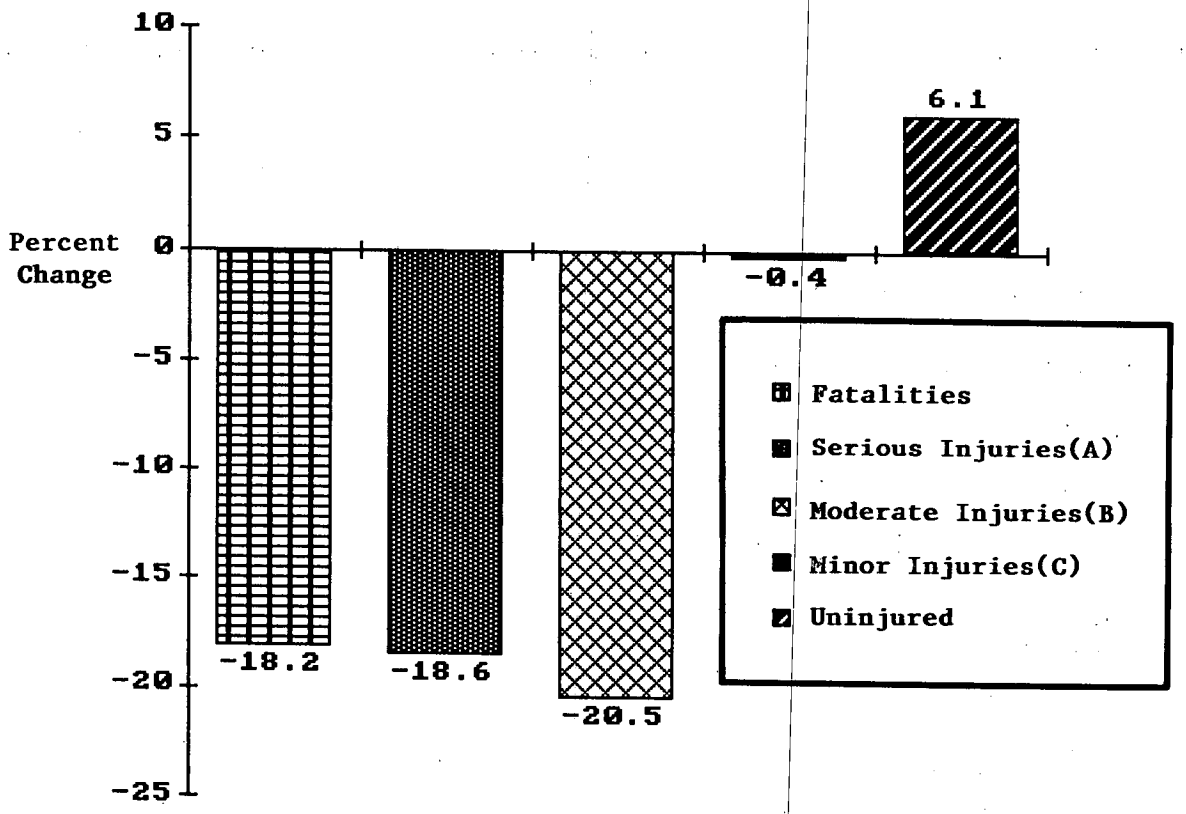
	*Baseline		1985 **Expected	Actual	***Difference Between Expected & Actual	Percentage Difference Expected & Actual
	N	Ratio	N	N	N	%
Fatalities	1093	0.27	1207	987	-220	-18.2
A Injuries	17058	4.17	18645	15176	-3469	-18.6
B Injuries	51077	12.48	55801	44360	-11441	-20.5
C Injuries	105232	25.71	114956	114487	-469	-0.4
Uninjured	234795	57.37	256517	272116	15599	6.1
Total Occupants	409255			447126		

* The baseline represents the mean of the 1982 and 1984 data.
** 1985 Expected = (Baseline Ratio) x (1985 Actual Total Occupants)
***Based on the chi square statistic, the differences between the expected and actual totals are statistically significant at the .01 level.

When the savings in each category are expressed as a percentage of the 1985 expected number for that category, the savings represent reductions of 18 percent in fatalities, 19 percent in A injuries, 21 percent in B injuries, and less than one percent in C injuries. The actual number of uninjured occupants was six percent higher than the number expected. These percentage reductions are presented graphically in Figure 3.1.

FIGURE 3.1

PERCENTAGE CHANGES IN FATALITIES AND INJURIES
FOR OCCUPANTS COVERED BY THE LAW



SEASONAL ANALYSES

The statewide fatality and injury data for occupants covered by the law were further analyzed by the four quarters of the year (Table 3.2). Large savings in fatalities and in serious and moderate injuries occurred within each of the four quarters of 1985. The second-quarter decrease in fatalities of nine percent was substantially lower than the decreases in the other three quarters, which ranged from 18 percent to 27 percent. The reason for this deviation is not readily apparent. The number of C injuries was slightly lower than expected in the first half of the year and slightly higher in the second half. Large savings in serious and moderate injuries and fatalities were sustained throughout the year.

The number of uninjured occupants was higher in all four quarters than would have been expected. The largest percentage increase in uninjured occupants occurred in the first quarter, with eight percent more uninjured persons than expected. The increase in uninjured persons dropped to six percent in the second quarter and then leveled off at five percent in the third and fourth quarters.

TABLE 3.2*

QUARTERLY STATEWIDE FATALITIES AND INJURIES
FOR OCCUPANTS COVERED BY THE LAW

	**Baseline N	Baseline Ratio	***Expected 1985 N	Actual 1985 N	Difference Between Expected & Actual N	Percent Difference Between Expected & Actual %
FIRST QUARTER						
Fatalities	225	0.24	231	169	-62	-26.8
A Injuries	3788	4.08	3921	3192	-729	-18.6
B Injuries	11891	12.80	12302	9285	-3017	-24.5
C Injuries	24157	26.01	24998	24195	-803	-3.2
Uninjured	52830	56.87	54657	59268	4611	8.4
Total Occupants	92891			96109		
SECOND QUARTER						
Fatalities	270	0.27	302	275	-27	-8.9
A Injuries	4235	4.17	4666	3744	-922	-19.8
B Injuries	12580	12.38	13851	10843	-3008	-21.7
C Injuries	25855	25.43	28452	28289	-163	-0.6
Uninjured	58700	57.75	64614	68734	4120	6.4
Total Occupants	101640			111885		
THIRD QUARTER						
Fatalities	289	0.28	320	264	-56	-17.5
A Injuries	4401	4.22	4821	4041	-780	-16.2
B Injuries	13092	12.57	14360	11566	-2794	-19.5
C Injuries	26068	25.02	28582	28856	274	1.0
Uninjured	60324	57.91	66156	69512	3356	5.1
Total Occupants	104174			114239		
FOURTH QUARTER						
Fatalities	309	0.28	350	279	-71	-20.3
A Injuries	4635	4.19	5233	4199	-1034	-19.8
B Injuries	13515	12.23	15274	12666	-2608	-17.1
C Injuries	29153	26.37	32934	33147	213	0.6
Uninjured	62942	56.93	71102	74602	3500	4.9
Total Occupants	110554			124893		

* Because the proportions in this table are based on the number of occupants within each quarter of the year rather than on the total occupants statewide, the data in this table and the statewide Table 3.1 may show slight variations. Slight variations may also be noted between the sum of the categories in this table and the statewide total as reported in Table 3.1 due to rounding or missing data elements for some accident records.

** The baseline represents the mean of the 1982 and 1984 data.

*** 1985 Expected = (Baseline Ratio) x (1985 Actual Total Occupants)

REGIONAL ANALYSIS

The data on fatalities and injuries involving the occupants covered by the law were also analyzed for three regions of the State. (Table 3.3) Analyses of the expected and actual totals for the post-law period indicated that all three regions experienced decreases in the number of fatalities and serious and moderate injuries and increases in the number of uninjured occupants. While the configuration of changes in the Long Island and Upstate regions was very similar, the shifts in injuries and fatalities in New York City differed from the other two regions.

When the actual number of uninjured occupants in 1985 was compared to the expected number, the number of uninjured occupants was four percent higher on Long Island, five percent higher Upstate, and 11 percent higher in New York City. The three regions experienced similar savings in A and B injuries. When the expected and actual totals were compared for these two categories combined, the decreases were 19 percent in the Long Island and Upstate regions and 22 percent in New York City. The percentage decrease in actual fatalities from the expected total, however, was much higher in New York City than in the other two regions. Fatalities declined 11 percent Upstate, 40 percent in New York City, and nine percent on Long Island. Finally, while the proportion of C or minor injuries increased marginally in the Upstate and Long Island regions, the number of C injuries in New York City in 1985 was seven percent lower than the expected total.

The reasons for the larger savings in New York City are not clear, but some of the differences between New York City and the rest of the State may be attributable to differences in the vehicle mix, average speed, and other variables that affect the nature of crashes.

TABLE 3.3*

FATALITIES AND INJURIES BY REGION
FOR OCCUPANTS COVERED BY THE LAW

	**Baseline		***Expected	1985 Actual	Difference Between Expected & Actual	Percent Difference Between Expected & Actual
	N	Ratio	N	N	N	%
UPSTATE						
Fatalities	748	0.38	787	700	-87	-11.1
A Injuries	9222	4.65	9626	7799	-1827	-19.0
B Injuries	28049	14.15	29293	23894	-5399	-18.4
C Injuries	45676	23.04	47698	49021	1323	2.8
Uninjured	114530	57.78	119617	125607	5990	5.0
Total Occupants	198225			207021		
NEW YORK CITY						
Fatalities	163	0.14	187	112	-75	-40.1
A Injuries	4466	3.97	5306	4329	-977	-18.4
B Injuries	11869	10.55	14101	10766	-3335	-23.7
C Injuries	35811	31.84	42556	39403	-3153	-7.4
Uninjured	60177	53.50	71505	79045	7540	10.5
Total Occupants	112486			133655		
LONG ISLAND						
Fatalities	182	0.18	192	175	-17	-8.9
A Injuries	3371	3.42	3641	3049	-592	-16.3
B Injuries	11160	11.32	12052	9702	-2350	-19.5
C Injuries	23748	24.10	25659	26073	414	1.6
Uninjured	60093	60.98	64924	67469	2545	3.9
Total Occupants	98554			106468		

* Because the proportions in this table are based on the number of occupants within each region rather than on the total occupants statewide, the data in this table and the statewide Table 3.1 may show slight variations. Slight variations may also be noted between the sum of the categories in this table and the statewide total as reported in Table 3.1 due to rounding or missing data elements for some accident records.

** The baseline represents the mean of the 1982 and 1984 data.
*** 1985 Expected = (Baseline Ratio) x (1985 Actual Total Occupants)

DEMOGRAPHIC CHARACTERISTICS OF OCCUPANTS INVOLVED IN ACCIDENTS

The accident data involving occupants covered by the law were also examined by the gender and age of the occupants.

Gender of Occupants

Table 3.4 presents the pattern of injuries and fatalities for male and female occupants. The baseline data show that men were much more likely than women to be involved in an accident. This difference is likely a reflection of gender differences in driving habits and levels of exposure. When involved as occupants in accidents, men were also more likely than women to sustain serious injuries or be killed, while women were more likely to receive minor injuries.

Because more men were involved in accidents, there was a much larger numerical savings in fatalities and injuries among male occupants in 1985. However, when the baseline and post-law patterns of injuries and fatalities for men and women were compared, the percentage changes in the categories of injury were very similar for both genders. The largest discrepancy between men and women occurred in fatalities. The percentage decrease in the number of fatalities was 20 percent for men and 14 percent for women.

TABLE 3.4*

FATALITIES AND INJURIES BY GENDER FOR OCCUPANTS COVERED BY THE LAW

	**Baseline N	Ratio	***1985 Expected N	Actual N	Difference Between Expected & Actual N	Percent Difference Between Expected & Actual %
MALE						
Fatalities	746	0.31	821	660	-161	-19.6
A Injuries	10303	4.23	11206	9263	-1943	-17.3
B Injuries	29757	12.22	32373	25919	-6454	-19.9
C Injuries	50888	20.90	55368	54364	-1004	-1.8
Uninjured	151805	62.34	165150	174712	9562	5.8
Total Occupants	243499			264918		
FEMALE						
Fatalities	346	0.21	381	327	-54	-14.2
A Injuries	6752	4.09	7424	5911	-1513	-20.4
B Injuries	21307	12.91	23433	18431	-5002	-21.3
C Injuries	54295	32.89	59698	60100	402	0.7
Uninjured	82379	49.90	90572	96739	6167	6.8
Total Occupants	165079			181508		

* Because the proportions in this table are based on the number of occupants within each gender category rather than on the total occupants statewide, the data in this table and the statewide Table 3.1 may show slight variations. Slight variations may also be noted between the sum of the categories in this table and the statewide total as reported in Table 3.1 due to rounding or missing data elements for some accident records.

** The baseline represents the mean of the 1982 and 1984 data.

*** 1985 Expected = (Baseline Ratio) x (1985 Actual Total Occupants)

Age of Occupants

Analyses of the data by age group are shown in Table 3.5. As explained in Chapter 2 of this report, children under the age of seven had been covered by a child restraint law prior to the implementation of the Mandatory Occupant Restraint Law.

When the data for uninjured occupants for the baseline and post-law periods were examined, the results indicated that a percentage increase in uninjured occupants occurred within each age group. The size of the percentage increase generally declined with age, but the variation was not great. The size of the increase ranged from five percent for persons older than 54 years to eight percent for children under 16 years.

Although a drop in fatalities occurred in all but one age group, the size of the percentage decreases varied widely among the age groups. The percentage decreases ranged from a high of 78 percent for the 10-15 year old age group to a low of nine percent for the 45-54 year old age group. It should be noted, however, that the large percentage decreases experienced by children ages 0-3 years, 4-6 years, and 10-15 years, can be misleading because of the relatively small numbers involved.

When the data for the baseline and post-law periods were examined for the three categories of injuries, the greatest variation among the age groups occurred for minor or C injuries. Each age group experienced substantial percentage decreases in the categories of A and B injuries. The combined savings in A and B injuries ranged from 15 percent for persons 7-9 years of age to 23 percent for persons 45-54 years of age. In the C injury category, sizable percentage decreases occurred in the age groups under 16 years, while negligible changes occurred among persons 16 years and older.

TABLE 3.5*

FATALITIES AND INJURIES BY AGE
FOR OCCUPANTS COVERED BY THE LAW

	**Baseline		***Expected	1985 Actual	Difference Between Expected & Actual	Percent Difference Between Expected & Actual
	N	Ratio	N	N	N	%
0-3 YEARS						
Fatalities	13	0.14	14	6	-8	-57.1
A Injuries	149	1.63	166	123	-43	-25.9
B Injuries	1054	11.54	1172	964	-208	-17.7
C Injuries	1433	15.70	1594	1291	-303	-19.0
Uninjured	6481	70.99	7210	7772	562	7.8
Total Occupants	9130			10156		
4-6 YEARS						
Fatalities	10	0.13	11	6	-5	-45.5
A Injuries	168	2.15	178	146	-32	-18.0
B Injuries	1091	13.98	1158	939	-219	-18.9
C Injuries	1440	18.44	1528	1337	-191	-12.5
Uninjured	5098	65.30	5410	5857	447	8.3
Total Occupants	7807			8285		
7-9 YEARS						
Fatalities	4	0.06	4	4	0	0.0
A Injuries	147	2.27	156	136	-20	-12.8
B Injuries	893	13.77	946	797	-149	-15.8
C Injuries	1408	21.72	1492	1336	-156	-10.5
Uninjured	4032	62.18	4272	4597	325	7.6
Total Occupants	6484			6870		
10-15 YEARS						
Fatalities	16	0.21	18	4	-14	-77.8
A Injuries	265	3.30	276	238	-38	-13.8
B Injuries	1148	14.31	1195	979	-216	-18.1
C Injuries	1883	23.47	1959	1824	-135	-6.9
Uninjured	4710	58.71	4901	5304	403	8.2
Total Occupants	8022			8349		
16-24 YEARS						
Fatalities	352	0.28	372	307	-65	-17.5
A Injuries	6107	4.89	6490	5353	-1137	-17.5
B Injuries	18664	14.94	19829	16322	-3507	-17.7
C Injuries	28836	23.08	30633	30827	194	0.6
Uninjured	70965	56.81	75401	79916	4515	6.0
Total Occupants	124924			132725		

TABLE 3.5* cont.

FATALITIES AND INJURIES BY AGE
FOR OCCUPANTS COVERED BY THE LAW

	**Baseline		1985 ***Expected	Actual	Difference Between Expected & Actual	Percent Difference Between Expected & Actual
	N	Ratio	N	N	N	%
25-44 YEARS						
Fatalities	360	0.24	406	326	-80	-19.7
A Injuries	6438	4.30	7281	5907	-1374	-18.9
B Injuries	17396	11.60	19642	15410	-4232	-21.5
C Injuries	42449	28.31	47936	47638	-298	-0.6
Uninjured	83289	55.55	94061	100045	5984	6.4
Total Occupants	149932			169326		
45-54 YEARS						
Fatalities	100	0.26	107	97	-10	-9.3
A Injuries	1470	3.76	1551	1233	-318	-20.5
B Injuries	4045	10.35	4270	3222	-1048	-24.5
C Injuries	11511	29.45	12150	12174	24	0.2
Uninjured	21963	56.18	23178	24530	1352	5.8
Total Occupants	39089			41256		
55-64 YEARS						
Fatalities	101	0.31	106	95	-11	-10.4
A Injuries	1158	3.61	1234	1011	-223	-18.1
B Injuries	3374	10.50	3591	2725	-866	-24.1
C Injuries	9040	28.15	9626	9668	42	0.4
Uninjured	18447	57.43	19639	20697	1058	5.4
Total Occupants	32120			34196		
65+ YEARS						
Fatalities	139	0.55	158	142	-16	-10.1
A Injuries	1001	3.99	1145	893	-252	-22.0
B Injuries	3048	12.14	3482	2684	-798	-22.9
C Injuries	6172	24.57	7048	7217	169	2.4
Uninjured	14757	58.75	16852	17749	897	5.3
Total Occupants	25117			28685		

* Because the proportions in this table are based on the number of occupants within each age group rather than on the total occupants statewide, the data in this table and the statewide Table 3.1 may show slight variations. Slight variations may also be noted between the sum of the categories in this table and the statewide total as reported in Table 3.1 due to rounding or missing data elements for some accident records.

** The baseline represents the mean of the 1982 and 1984 data.
*** 1985 Expected = (Baseline Ratio) x (1985 Actual Total Occupants)

SEATING POSITION OF OCCUPANTS

In the final set of analyses, the injuries and fatalities sustained by occupants in vehicles covered by the law were examined by the seating position of the occupants. Table 3.6 presents information for four categories of occupants: drivers, front seat passengers, back seat passengers under ten years of age, and back seat passengers ten years of age and over. Of these four categories, back seat passengers ten years of age and older were the only group not covered by the law.

Prior to the law's implementation, the fatality and injury patterns for back seat passengers under ten years of age differed substantially from the patterns for the other three groups. Children in the back seat were much less likely to be killed or to sustain an A or C injury. This finding may largely be attributed to greater restraint use among children covered by the child restraint legislation implemented before the Mandatory Occupant Restraint law.

According to Table 3.6, sizable percentage decreases in fatalities occurred in 1985 among the groups covered by the law: drivers, front seat passengers and back seat passengers under ten years of age. When differences between the actual and expected 1985 fatality totals were examined, the percentage decrease was 16 percent for drivers, 25 percent for front seat passengers and 40 percent for back seat passengers under ten years of age. The group not covered by the law, back seat passengers ten years and older, experienced only a one percent decline in fatalities.

The number of uninjured occupants in each seating position was higher in 1985 than the predicted number. The percentage increase in uninjured occupants ranged from five percent for drivers to eight percent for front seat passengers and back seat passengers ten years of age and older.

Large percentage declines also occurred in the number of very serious (A) and moderately serious (B) injuries sustained by occupants in each of the four groups. Drivers and front seat passengers experienced the largest declines; the total A and B combined injuries for these groups were reduced by 20 percent and 22 percent, respectively, from the expected totals. The decline for back seat passengers under ten years of age was 13 percent, while older back seat passengers experienced a decline of 16 percent. When the differences between the actual and expected totals for 1985 were examined, decreases of 15 percent and eight percent in minor injuries (C) occurred among back seat passengers under ten years of age and back seat passengers ten years of age and older, respectively. Front seat passengers experienced two percent fewer minor injuries, while drivers experienced one percent more minor injuries.

The fact that a savings in fatalities and injuries also occurred among back seat passengers ten years of age and older, even though the law did not apply to this group, may be a spillover benefit from the law. Although attitudinal surveys found that virtually all New York State drivers were aware that the Mandatory Occupant Restraint Law had been passed, there may have been many who were not aware that back seat passengers over ten were not covered by the law. Another explanation could be that an increase in restraint use by front seat occupants may have provided an incentive for adult back seat passengers to buckle up as well.

TABLE 3.6

FATALITIES AND INJURIES BY SEATING POSITION
FOR ALL OCCUPANTS IN VEHICLES COVERED BY THE LAW

	*Baseline N	Ratio	1985 **Expected N	Actual N	Difference Between Expected & Actual	Percent Difference Between Expected & Actual %
DRIVERS						
Fatalities	791	0.28	888	749	-139	-15.7
A Injuries	12355	4.30	13643	11167	-2476	-18.1
B Injuries	35490	12.34	39151	31292	-7859	-20.1
C Injuries	72372	25.17	79857	80598	741	0.9
Uninjured	166476	57.91	183731	193464	9733	5.3
Total Occupants	287484			317270		
FRONT SEAT PASSENGERS						
Fatalities	285	0.27	302	226	-76	-25.2
A Injuries	4437	4.19	4683	3758	-925	-19.8
B Injuries	13854	13.08	14619	11349	-3270	-22.4
C Injuries	30082	28.41	31752	31181	-571	-1.8
Uninjured	57244	54.05	60408	65250	4842	8.0
Total Occupants	105902			111764		
BACK SEAT PASSENGERS UNDER TEN YEARS						
Fatalities	17	0.11	20	12	-8	-40.0
A Injuries	266	1.67	302	252	-50	-16.6
B Injuries	1733	10.92	1977	1721	-256	-12.9
C Injuries	2778	17.50	3167	2709	-458	-14.5
Uninjured	11081	69.80	12634	13406	772	6.1
Total Occupants	15875			18100		
BACK SEAT PASSENGERS TEN YEARS AND OVER						
Fatalities	92	0.23	94	93	-1	-1.1
A Injuries	1397	3.51	1437	1235	-202	-14.1
B Injuries	4282	10.76	4405	3666	-739	-16.8
C Injuries	11136	27.98	11454	10596	-858	-7.5
Uninjured	22898	57.52	23548	25348	1800	7.6
Total Occupants	39805			40938		

* The baseline represents the mean of the 1982 and 1984 data.
** 1985 Expected = (Baseline Ratio) x (1985 Actual Total Occupants)

4. DISCUSSION

This report has focused on the ultimate measure of New York State's Mandatory Occupant Restraint Law: reductions in fatalities and the severity of injuries sustained by vehicle occupants. The report represents the first detailed analyses of accidents involving occupants covered by the law, that is, front seat occupants and children under the age of ten, regardless of seating position.

Comparisons between a two-year baseline period and 1985, the first year of the law's full implementation, provide clear evidence that New York's Mandatory Occupant Restraint Law produced substantial savings in 1985. If the fatality/injury pattern in 1985 had followed the baseline pattern, an estimated 220 more occupants would have been killed, 3,500 more occupants would have been seriously injured, 11,400 more occupants would have sustained moderate injuries, and 470 more occupants would have sustained minor injuries. While these results provide strong support for the safety belt law, a number of issues related to the conduct of the analyses and the findings merit further discussion.

In this study, as in any non-experimental research, it is appropriate to exercise some caution in interpreting the findings. As explained in Chapter 2, limitations in the available data base placed constraints on the scope of the analysis plan and meant that the savings in lives and injuries could only be estimated. The two major limitations in the data that affected the research design and the results were the inherent imprecisions in the injury classification system and the absence of reliable data on restraint use among accident victims.

The New York State Department of Motor Vehicles' accident file is the only statewide data base available for identifying changes in the severity of injuries sustained in traffic accidents. The information on injuries in this file is taken from police reports on accidents. Accident victims' injuries and physical condition, described on the police report, are not based on medical diagnoses and, therefore, may be inaccurate. However, since this information is translated into a classification scheme (K, A, B, C) with relatively broad categories, some of the inaccuracies should be mitigated. Furthermore, since there is no evidence that the way injuries were reported changed between the baseline period and 1985, the degree of error should be consistent. Nevertheless, the savings in each injury category can only be estimated.

The second major limitation of the data had an even greater effect on the determination of the savings in lives and injuries. The availability of reliable baseline and post-law data on safety restraint use in accidents would make it possible to attribute the savings to the safety belt law with more confidence. However, the restraint use reported on police accident reports is usually based on self-reporting by the accident victims. Self-reported usage rates, even in anonymous telephone surveys, are much higher than those found in roadside observational surveys. It is highly unlikely that persons involved in accidents would admit that they were violating the law by not buckling up. In addition, unlike the reporting of injuries, there is every reason to believe that the reporting of restraint use changed between the baseline period and 1985. Therefore, these data were not considered in the analyses.

Since it is impossible to know to what extent restraint use among accident victims increased and, therefore, to identify more specifically the effects of the law, some portion of the savings estimated for 1985 may be attributable to other factors. One potential alternative explanation for the savings is efforts in other areas of traffic safety. However, no other major traffic safety initiatives occurred in 1985. Apart from the safety belt law, the most comprehensive traffic safety program in New York State is the alcohol and highway safety program known as STOP-DWI. The STOP-DWI program has been in effect since November 18, 1981. As explained in Chapter 2, the baseline period for this study was specifically chosen to avoid the contaminating effects of the STOP-DWI program. Although research conducted by the Institute for Traffic Safety Management and Research has found continuing positive effects from STOP-DWI, the largest effects occurred in the first years of the program, well before 1985. Nevertheless, STOP-DWI and other safety programs may have contributed to the savings in 1985.

Another complicating factor in determining the true savings from the law is related to increases in the vehicle miles travelled (VMT). The VMT in New York State rose from 80.4 billion miles in 1982 to 90.5 billion miles in 1985, and the number of reportable accidents increased from 268,959 in 1982 to 292,804 in 1985. In order to control for these increases, the analysis plan viewed any changes in fatalities and injuries as changes in the proportion of total occupants killed, injured or uninjured. While it is clear that the number of accidents increased as VMT increased, it is not known if the types of accidents changed as more vehicle miles of travel were logged. Thus, increased VMT may have had an undetermined effect on the estimates of savings.

Two other lesser factors that affected the estimates of savings calculated in this report were the change in the reporting requirement for property damage accidents and the existence of earlier child restraint legislation. In September 1985, the minimum reporting level for property damage accidents increased from $400 to $600. This means that fewer of the non-injury accidents occurring between September and December 1985 were reported and, therefore, that the savings in injuries may have been underestimated.

The second factor known to affect the estimated savings involves injuries to children under seven years of age. These children were covered by child restraint legislation prior to the implementation of the Mandatory Occupant Restraint Law. However, the savings for this age group were included in the savings attributed to the safety belt law because any additional positive results for these children in 1985 were very likely due to the spillover benefits of mandatory safety belt use for other vehicle occupants. The decision to include this age group in the estimated savings was based on the fact that increases in restraint usage among children under seven were measured in observational surveys conducted by the Institute for Traffic Safety Management and Research in 1985.

One issue of interest is how the estimated savings in fatalities compared to the savings that were anticipated, based on the effectiveness of occupant restraints in preventing or mitigating injury. A computation of the anticipated fatality savings is based on the proportion of restraint use in crashes before and after the law and the effectiveness of restraints in preventing fatalities. Since the proportions of restraint usage in accidents and the effectiveness of restraints can only be estimated, the anticipated savings can also only be estimated.

The National Highway Traffic Safety Administration has estimated that the use of occupant restraints is between 40 and 50 percent effective in preventing fatalities among front seat occupants. Although reliable data on usage among accident victims are not available, usage rates among front seat occupants were measured in roadside surveys. As part of the evaluation of the safety belt law, the Institute for Traffic Safety Management and Research conducted a series of baseline and post-law observation surveys of restraint use by front seat occupants. These surveys identified statewide usage rates of 16 percent in October 1984, 57 percent in April 1985, and 46 percent in September 1985. In a limited observational survey of four areas conducted in January 1985, usage rates were found to range from 63 percent ot 76 percent. Taking the baseline usage rate as 16 percent and the post-law usage rate as 55 percent, and assuming an effectiveness rate of 45 percent, an anticipated reduction of 19 percent is derived.[1] This compares with the 18 percent reduction in fatalities among front seat occupants identified in this report. It should be noted that the average baseline usage rate for 1982-1984 was probably lower than the 16 percent measured in October 1984, since publicity surrounding the passage of the law may have increased usage prior to the law's actual implementation. Using this formula, a lower pre-law rate would produce a larger anticipated reduction.

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[1] James Hedlund, "Casualty Reduction Resulting from Safety Belt Use Laws," OECD Working Paper, OECD Working Group Session III, Washington, DC, November 1985. Formula: proportionate fatality reduction = $(e(u_2-u_1)/(1-eu_1)$

The analyses presented in this report, however, did not focus exclusively, or even primarily, on reductions in fatalities in assessing the effectiveness of the Mandatory Occupant Restraint Law. The mitigation and prevention of injuries also represent an important benefit of safety belt laws, especially since restraint use cannot prevent fatalities in some very severe accidents. Furthermore, some portion of fatal accidents are caused by "high risk drivers" who may be less likely than other drivers to comply with the safety belt law.

This report represents the first major analysis of New York State injury and fatality experience under mandatory occupant restraint legislation. In addition to analyses of statewide fatalities and injuries, analyses of the data by several variables were conducted. These analyses indicated that savings in fatalities and serious injuries occurred during each quarter of the year, within each region of the State, for both men and women, for each age group and for occupants in each seating position. However, substantial variations in the size or pattern of savings were also identified for some of these variables. Explanations for these variations are not readily apparent at this point. However, analyses of the 1986 and future post-law fatality and injury data will indicate whether these differences are sustained over time and, if so, may provide some insight into the reasons for the variations. These results will be important to New York and other states in determining where the greatest benefits of mandatory restraint use laws can be expected.