

**Incident Experience of Massachusetts Drivers
Before and After Participation in the
DDC-Attitudinal Dynamics of Driving Course
During the Period from January 1, 2011 to January 1, 2014**

Submitted to the
Commonwealth of Massachusetts
Registry of Motor Vehicles

February 2015



1121 Spring Lake Drive
Itasca, Illinois 60143

EXECUTIVE SUMMARY

This study compares the motor-vehicle records for 12 months before participation in the Defensive Driving Course (DDC) Attitudinal Dynamics of Driving (ADD) Course with participants' 12 month post-ADD experience and indicates any significant differences in incidents. Use of the DDC-ADD program satisfies provisions of Chapter 175, section 113B, of the Motor Vehicle and Traffic Laws of Massachusetts. In 2010, this section was modified to state that drivers subject to suspension for accumulating *three surchargeable incidents* within the past 24 months must be required to complete a *driver education program*, which may be completed in lieu of suspension. Prior to October 2010, the law required the driver education program training for drivers who had accumulated five surchargeable incidents within a three year period.

The findings presented in this report are limited to those drivers who attended DDC-ADD during the 2012 calendar year. Violation experience of these 47,485 drivers was analyzed from January 1, 2011 to January 1, 2014. This time frame allows for the capturing of violations 12 months before and after any training event occurring in 2012. If drivers completed more than one training event during the study period, both the cumulative impact of all training events as well as the improvement associated with each individual training event was assessed. Three categories of motor vehicle incidents were analyzed:

- Major traffic violations
- Minor traffic violations
- Surchargeable violations

Results summary:

- Of the 47,485 drivers included in this study:
 - 37,571 completed DDC-ADD once
 - 7,783 completed DDC-ADD twice
 - 1,626 completed DDC-ADD three times
 - 389 completed DDC-ADD four times
 - 91 completed DDC-ADD five times
 - 19 completed DDC-ADD six times
 - 4 completed DDC-ADD seven times
 - 1 completed DDC-ADD eight times
 - 1 completed DDC-ADD nine times
- The cumulative impact of DDC-ADD was assessed by comparing the violation experience 12 months before the first training event against the 12 months following the last training event. If drivers completed only one training event, the 12 months before and after the training date was compared. Using this cumulative impact method, the following results were found:
 - All participant groups had significantly fewer violations in the 12 months after taking DDC-ADD than in the 12 months before (regardless of age group or sex).
 - Minor traffic violations decreased an average of 80% the 12 months following DDC-ADD participation

- Major traffic violations decreased an average of 77% the 12 months following DDC-ADD participation
- Surchargeable violations decreased an average of 82% the 12 months following DDC-ADD participation
- A second analysis method was used to assess the individual impact of each DDC-ADD training event. This analysis method compared the 12 months before and after each individual training event (from one training event through six training events).
 - Training events one through six are each associated with significantly fewer violations for the 12 months following training compared to the 12 months prior to training. Training events seven through nine had insufficient sample sizes to test.
 - Training events one through six are each individually associated with between 78% to 85% decreases in minor violations for the 12 months following DDC-ADD participation.
 - Training events one through six are each individually associated with between 56% to 78% decreases in major traffic violations for the 12 months following DDC-ADD participation.
 - Training events one through six are each individually associated with between 80% to 86% decreases in surchargeable violations for the 12 months following DDC-ADD participation.

In summary, based on the information made available by the Commonwealth of Massachusetts RMV, participants in this study showed statistically significant reductions in minor, major, and surchargeable incidents in the 12 months after exposure to the DDC-ADD course compared with the 12 months before.

INTRODUCTION

In January 1994, the Commonwealth of Massachusetts began using the National Safety Council's Attitudinal Dynamics of Driving (ADD) for the retraining of repeat traffic offenders. This is the sixth report to the Registry of Motor Vehicles in fulfillment of the Council's contractual commitment "to routinely measure and document the effectiveness" of the DDC-ADD program.

Use of the DDC-ADD program satisfies provisions of Chapter 175, section 113B, of the Motor Vehicle and Traffic Laws of Massachusetts. In 2010, this section was modified to state that drivers subject to suspension for accumulating *three surchargeable incidents* within the past 24 months must be required to complete a *driver education program*, which may be completed in lieu of suspension. Prior to October 2010, the law required the driver education program training for drivers who had accumulated five surchargeable incidents within a three year period.

A *surchargeable incident* is an "at-fault" accident or conviction of moving violations under motor vehicle laws that can increase a driver's insurance surcharge points under the Safe Driver Insurance Plan (SDIP). A surchargeable incident is defined by the nature of the violation and not by the number of citations. It is possible, therefore, to receive several surcharge points for a single citation. The Massachusetts Point System defines surchargeable incidents as follows:

- Minor Traffic Law Violations: = **2 points**
- Minor Accidents (at fault in excess of 50%):
(between \$501 and \$2001 property damage/collision/bodily injury coverage) = **3 points**
- Major Accidents (at fault in excess of 50%):
(exceeds \$2001 property damage/collision/bodily injury coverage) = **4 points**
- Major Traffic Law Violations: = **5 points**

The NSC Attitudinal Dynamics of Driving is an 8-hour course with the new 4th Edition being divided into eight units of instruction. It emphasizes small group discussion and active dialogue between the instructor and the students. During the course, students first discuss the traffic citations that brought them to the class. They then complete an activity that demonstrates they do in fact know their state's traffic laws. Next, students are exposed to the concepts of Choice Theory, helping them to understand how their actions are a result of their own choices. They learn that it is up to them to drive poorly or properly, and how they can change. They are then guided in making a plan of action in which they practice good driving behavior.

Of the 4.6 million licensed drivers in the Commonwealth of Massachusetts, 151,393 have taken the NSC ADD course under the new Three Surchargeable Event program which went into effect in October 2010. Of these drivers, 66% (99,776) have only taken the program one time; 23% (31,150) have taken the program one or two times; and 13% (20,467) have taken the program 3 or more times.

The findings presented in this report are limited to those drivers who attended ADD during the 2012 calendar year. Violation experience of these 47,485 drivers was analyzed from January 1, 2011 to January 1, 2014. This time frame allows for the capturing of violations 12 months before and after any training event occurring in 2012.

METHOD

The National Safety Council (NSC) sent the Massachusetts Registry of Motor Vehicles (RMV) a computerized list of 49,671 drivers who completed the ADD course. This driver group attended the course during the 2012 calendar year. The RMV furnished a computerized list containing the motor-vehicle records (MVRs) of 47,485 drivers with matching motorist IDs, valid training class completion dates, and at least one offense during the study period.

The course participant MVR data used in this study were as follows:

- Motorist ID
- Gender
- Birth date
- Training date
- Incident date
- Major/Minor traffic violation code
- Surchargeable violation indicator

Statistical tests were performed using the computer software package SPSS. Paired samples *t*-tests were used for pre/post comparisons of mean violations per driver. Two types of *t*-tests were used. One used the actual MVR data of each subject and the other used the square root of each subject's data. The square root transformation was done to equalize pre- and post-course variances. When rare event means, such as surchargeable incidents, are compared, inequality between their variances can be large enough to violate a primary assumption that must be followed for the valid use of a *t*-test (Snedecor & Cochran, 1989).

An alpha level of .05 was used for all statistical tests, i.e. a requirement of at least 95% probability that differences were not due to chance alone.

Because drivers included in this study could participate in ADD multiple times, two strategies were used to explore the possible impact of the program.

The first analysis strategy treats multiple training events as a single intervention. This approach allows for the assessment of the cumulative impact of ADD regardless of the number of times a driver participated in the training program during the study period. The cumulative impact of ADD was assessed by comparing the violation experience 12 months before the first training event against the 12 months following the last training event. If drivers completed only one training event, the 12 months before and after the training date was compared.

The second analysis strategy assesses the individual impact of each of the training events separately. This analysis method compared the 12 months before and after each individual training event (from one training event through six training events). However, because multiple training events could be closely spaced in time, it was not always possible to fully isolate the individual impact of a single training event.

RESULTS

Demographics

The mean age of the 47,485 ADD participants was 33.0 years. The mean age for male participants was 32.8 years, while the mean age for females was 33.4 years. Females made up 29% of the drivers studied.

A slightly larger proportion of the male drivers were under 21 years old compared to female drivers, 12.0% versus 9.2%, while a larger proportion of female drivers were 21 to 64 years old compared to male drivers, 88.3% versus 85.9%. About 2% of the drivers were aged 65 and older in the study group. As the number of training events attended by a driver increases, the demographics of drivers generally shift to increasing proportions of male and younger drivers under 21 years of age. See Table 1 for the demographic breakdown of drivers by the number of training completions.

Table 1. Number and Percentage of ADD Course Participants by Gender, Age and Number of Training Events

Age Group	Gender					
	Male		Female		TOTAL	
	Number	%	Number	%	Number	%
All Participants						
Under 21	3,944	12.0	1,274	9.2	5,299	11.2
21-64	28,269	85.9	12,155	88.3	41,126	86.6
65 and older	709	2.1	340	2.5	1,060	2.2
TOTAL	32,922	100.0	13,769	100.0	47,485	100.0
Participants Completing One Training Event						
Under 21	2,746	10.7	980	8.8	3,802	10.1
21-64	22,314	87.0	9,910	88.6	32,863	87.5
65 and older	600	2.3	296	2.6	906	2.4
TOTAL	25,660	100.0	11,186	100.0	37,571	100.0
Participants Completing Two Training Events						
Under 21	849	15.1	231	11.1	1,084	13.9
21-64	4,699	83.3	1,816	87.2	6,570	84.4
65 and older	93	1.6	35	1.7	129	1.7
TOTAL	5,641	100.0	2,082	100.0	7,783	100.0
Participants Completing Three Training Events						
Under 21	251	20.5	45	11.5	297	18.3
21-64	963	78.5	340	87.0	1,310	80.6
65 and older	13	1.0	6	1.5	19	1.1
TOTAL	1,227	100.0	391	100.0	1,626	100.0

Table 1. (Continued) Number and Percentage of ADD Course Participants by Gender, Age and Number of Training Events

Age Group	Gender					
	Male		Female		TOTAL	
	Number	%	Number	%	Number	%
Participants Completing Four Training Events						
Under 21	75	25.0	13	14.8	88	22.6
21-64	222	74.0	72	81.8	295	75.8
65 and older	3	1.0	3	3.4	6	1.6
TOTAL	300	100.0	88	100.0	389	100.0
Participants Completing Five Training Events						
Under 21	15	20.5	4	22.2	19	20.9
21-64	58	79.5	14	77.8	72	79.1
65 and older	0	0.0	0	0.0	0	0.0
TOTAL	73	100.0	18	100.0	91	100.0
Participants Completing Six Training Events						
Under 21	7	43.8	3	100	7	36.8
21-64	9	56.2	0	0.0	12	63.2
65 and older	0	0.0	0	0.0	0	0.0
TOTAL	16	100.0	3	100.0	19	100.0
Participants Completing Seven Training Events						
Under 21	1	25.0	0	0.0	1	25.0
21-64	3	75.0	0	0.0	3	75.0
65 and older	0	0.0	0	0.0	0	0.0
TOTAL	4	100.0	0	0.0	4	100.0
Participants Completing Eight Training Events						
Under 21	0	0	1	100.0	1	100.0
21-64	0	0	0	0	0	0
65 and older	0	0	0	0	0	0
TOTAL	0	0	1	100.0	1	100.0
Participants Completing Nine Training Events						
Under 21	0	0.0	0	0.0	0	0.0
21-64	1	100.0	0	0.0	1	100.0
65 and older	0	0.0	0	0.0	0	0.0
TOTAL	1	100.0	0	0.0	1	100.0

The majority of drivers included in this study completed only one training event during the study period. Of the 47,485 drivers included in this study, 37,571 (79%) completed one training event, 7,783 (17%) completed two training events, 1,626 (3%) completed three training events, and 505 (1%) completed four or more training events. On average, drivers who completed two or more training events attended training over a span of 3.65 months. In general, as the number of completed training events increases, so does the span of time used to attend the multiple training events. Drivers who completed two training events took on average 3.50 months while those

drivers who completed five training events took an average of 5.29 months. See Table 2 for a summary of the number of months spent attending multiple training events.

Table 2. Number of Months Spent Attending Multiple Training Events

	Number of Participants	Average
Months between first and last training events (excluding the 37,571 drivers who attended only one training event)	9,914	3.65 months
Participants Completing Two Training Events	7,783	3.50 months
Participants Completing Three Training Events	1,626	4.52 months
Participants Completing Four Training Events	389	5.22 months
Participants Completing Five Training Events	91	5.29 months
Participants Completing Six Training Events	19	4.74 months
Participants Completing Seven Training Events	4	5.39 months
Participants Completing Eight Training Events	1	2.30 months
Participants Completing Nine Training Events	1	7.75 months

First Analysis Strategy

The first set of analyses explores the cumulative impact of ADD, regardless of the number of training events completed during the study period. Table 3 shows the mean (average) number of violations per participant in the study group in the 12 months prior to completing the first ADD training event and the 12 months following exposure to the last DDC-ADD training event as well as the percent changes in the means. Analysis found that all participant groups, regardless of age group or sex, had significantly fewer violations in the 12 months after completing ADD than in the 12 months before the first ADD training event.

As shown in the "All Age Groups" column in Table 3, males and females had statistically significant reductions across the three MVR categories defined in this study using both raw data and the square root transformations. Percentage reductions in incidents after ADD ranged from a 75% decrease in major traffic violations for males in the 21 to 64 age group, to a 91% decrease in major and surchargeable violations by females in the 65 and older age group. Females had consistently greater post ADD reductions in the all violation categories and all age groups than did males.

The cumulative impact of ADD participation was also assessed by number of training events completed. As shown in Table 4, participants completing from one to six training events had fewer violations in the 12 months after completing their last ADD training event than in the 12 months before their first ADD training event. For drivers completing from one to five training events, the decreases of minor traffic violations, major traffic violations and surchargeable violations were all found to be statistically significant. For drivers completing a total of six training events, the decreases of minor traffic violations and surchargeable violations were also determined to be statistically significant. However, the decrease of major traffic violations was not. Violations of this type decreased 45%, which while substantial, does not meet the statistical criteria for significance. This exception may be the result of the small sample size (19) of drivers completing a total of six training events. Drivers completing seven through nine training events had insufficient sample sizes to test.

Table 3. Cumulative Impact of ADD Training Events (Regardless of the Number of Training Events Completed) - Mean Number of Before/After Violations and Percentage Change by Age and Sex

Sex	Age Group											
	Under 21 Years Old			21-64 Years Old			65 And Older			All Age Groups		
	Before	After	% Chg.	Before	After	% Chg.	Before	After	% Chg.	Before	After	% Chg.
Minor Traffic Violation												
Male	2.56	0.60	-77	2.06	0.42	-80	1.62	0.20	-86	2.12	0.44	-79
Female	2.09	0.41	-80	1.89	0.30	-84	1.44	0.14	-90	1.90	0.31	-84
Total	2.45	0.55	-78	2.02	0.38	-81	1.57	0.18	-88	2.06	0.40	-80
Major Traffic Violations												
Male	0.47	0.11	76.6	0.36	0.09	-75	0.56	0.07	-88	0.38	0.09	-76
Female	0.53	0.10	81.1	0.42	0.08	-81	0.64	0.06	-91	0.44	0.08	-82
Total	0.48	0.11	77.1	0.38	0.09	-76	0.58	0.07	-88	0.39	0.09	-77
Surchargeable Violations												
Male	2.62	0.55	-79	2.18	0.40	-82	2.10	0.25	-88	2.23	0.42	-81
Female	2.38	0.42	-82	2.15	0.32	-85	2.05	0.19	-91	2.17	0.33	-85
Total	2.57	0.51	-80	2.18	0.38	-83	2.09	0.23	-89	2.22	0.39	-82

Note: *t*-tests were conducted on both male and female means using raw data and the square root transformation. All changes in means from before to after were statistically significant ($p < 0.05$).

Table 4. Cumulative Impact of ADD Training Events - Mean Number of Before/After Violations and Percentage Change by Total Number of Training Events Completed

	Before	After	Percent Change
All Participants			
Minor Traffic Violations	2.06	0.40	-81
Major Traffic Violations	0.39	0.09	-77
Surchargeable Violations	2.22	0.39	-82
Participants Completing a Total of One Training Event			
Minor Traffic Violations	1.84	0.36	-80
Major Traffic Violations	0.36	0.08	-78
Surchargeable Violations	2.00	0.36	-82
Participants Completing a Total of Two Training Events			
Minor Traffic Violations	2.66	0.50	-81
Major Traffic Violations	0.49	0.11	-77
Surchargeable Violations	2.83	0.49	-83
Participants Completing a Total of Three Training Events			
Minor Traffic Violations	3.40	0.59	-83
Major Traffic Violations	0.55	0.12	-78
Surchargeable Violations	3.48	0.56	-84
Participants Completing a Total of Four Training Events			
Minor Traffic Violations	4.49	0.59	-87
Major Traffic Violations	0.65	0.14	-78
Surchargeable Violations	4.45	0.54	-88
Participants Completing a Total of Five Training Events			
Minor Traffic Violations	4.82	0.81	-83
Major Traffic Violations	0.70	0.12	-83
Surchargeable Violations	4.75	0.73	-85
Participants Completing a Total of Six Training Events			
Minor Traffic Violations	7.26	0.74	-90
Major Traffic Violations	0.68	0.37	-45*
Surchargeable Violations	6.74	0.84	-88

Note: *t*-tests were conducted using raw data and the square root transformation.

All but one of the changes in the means from before to after were statistically significant ($p < 0.05$). The one non-significant change is marked with an *.

Second Analysis Strategy

The second analysis strategy assesses the individual impact of each of the training events separately. This analysis method compared the 12 months before and after each individual training event (from one training event through six training events). As shown in Table 5, training events one through six are all associated with significantly fewer violations in the 12 months after completing the ADD training event than in the 12 months before that training event. Training events seven through nine had insufficient sample sizes to test. Although this analysis strategy assesses each training event separately, many of the multiple training events were completed within a short period of time, with as little as one day separating some training events. Therefore it is not always possible to fully isolate the individual impact of a single training event.

Table 5. Individual Training Impact - Mean Number of Before/After Violations and Percentage Change by Training Event Number

	Before	After	Percent Change
Impact of First Training Event			
Minor Traffic Violations	2.06	0.45	-78
Major Traffic Violations	0.39	0.10	-74
Surchargeable Violations	2.22	0.45	-80
Impact of Second Training Event			
Minor Traffic Violations	2.66	0.56	-79
Major Traffic Violations	0.49	0.12	-76
Surchargeable Violations	2.81	0.54	-81
Impact of Third Training Event			
Minor Traffic Violations	3.28	0.62	-81
Major Traffic Violations	0.56	0.13	-77
Surchargeable Violations	3.41	0.59	-83
Impact of Fourth Training Event			
Minor Traffic Violations	4.00	0.66	-84
Major Traffic Violations	0.63	0.14	-78
Surchargeable Violations	4.04	0.60	-85
Impact of Fifth Training Event			
Minor Traffic Violations	4.40	0.84	-81
Major Traffic Violations	0.72	0.16	-78
Surchargeable Violations	4.42	0.76	-83
Impact of Sixth Training Event			
Minor Traffic Violations	6.44	0.96	-85
Major Traffic Violations	0.64	0.28	-56
Surchargeable Violations	6.28	0.88	-86

Note: *t*-tests were conducted using raw data and the square root transformation. All changes in means from before to after were statistically significant ($p < 0.05$).

Summary

In summary, based on the information made available by the Commonwealth of Massachusetts RMV, participants in this study showed statistically significant reductions in minor, major, and surchargeable incidents in the 12 months after exposure to the ADD course compared with the 12 months before. These reductions were significant regardless of which of several methods of analysis was used, and were consistent whether considering each training event individually or grouped together as one intervention.

Regarding the impact of the recent changes in legislation, strict comparisons of groups from before and after the legislation are not possible since a comparable study group from before the legislative change is not available. However, the effect of the legislative change is to expose more subjects than before to an intervention that has shown to result in reduction of incidents. Having more drivers participate in this activity naturally implies a greater effect on Massachusetts' roads.

REFERENCES

Norusis, M.J. (2008). *SPSS/PC+ Version 16.0* [Computer Software]. Chicago: SPSS Inc.

Snedecor, G. W. & Cochran W.G. (1989). *Statistical Methods* (8th ed.). Ames, IA: Iowa State University Press.