

Incident Experience of Massachusetts Drivers Before and After Participation in the *Defensive Driving Online Course*

Analysis January 1, 2019 through December 31, 2021

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Executive Summary

In response to pandemic-related public health concerns in 2020, the National Safety Council (NSC) shifted from providing the traditional in-class *DDC Attitudinal Dynamics of Driving* course (*DDC ADD*) to offering the *Defensive Driving Online* course (*DDC Online*). The goal of this study is to determine if violation rates the year following DDC Online training (2021) were statistically lower than in the year prior to training (2019).

The findings presented in this report are limited to those drivers who completed *DDC Online* during the 2020 calendar year. The violation experience of these 31,654 drivers was analyzed from January 1, 2019 to December 31, 2021. This timeframe allows for the capturing of violations one year before and after any training event occurring in 2020. Four categories of motor-vehicle incidents were analyzed:

- All violations reported
- Major traffic violations
- Minor traffic violations
- Surchargeable violations

Results summary:

- Of the 31,654 drivers included in this study:
 - Gender:
 - 22,018 are male
 - 9,636 are female
 - Age:
 - 2,414 are under 21
 - 28,266 are 21 to 64
 - 974 are 65 or older
 - Number of training events completed in 2020:
 - 24,783 completed one training event
 - 4,783 completed two training events
 - 1,362 completed three training events
 - 827 completed four or more training events
- The impact of *DDC Online* was measured by assessing the violation rate experience in 2019 (year prior to training) against 2021 (year following the training). The following results were found:
 - Drivers experienced significantly lower total, minor, major, and surchargeable violation rates per 100 drivers in the year following training than in the year before training:
 - Total violation rates for *DDC Online* participants achieved a 71% decrease from 2019 to 2021.
 - Minor violation rates for *DDC Online* participants achieved a 74% decrease from 2019 to 2021.
 - Major violation rates for *DDC Online* participants achieved a 38% decrease from 2019 to 2021.

- Surchargeable violation rates for *DDC Online* participants achieved a 74% decrease from 2019 to 2021.
- Regardless of age or gender, drivers experienced significant reductions in surchargeable violation rates per 100 drivers:

These results highlight a very important aspects of the *MA Driver Re-Training Program* during 2020:

- The shift from *DDC ADD* to *DDC Online* in response to public health concerns provided drivers with an effective alternative training program. Drivers exposed to *DDC Online* in 2020 experienced significantly lower violation rates the year following training than they did the year before training.

Introduction

In response to pandemic-related public health concerns in 2020, the NSC started providing the *Defensive Driving Online* course (*DDC Online*) to Massachusetts drivers. This study assesses the violation experiences of drivers who completed *DDC Online* in 2020. The goal of the study is to determine if violation rates the year following training (2021) were statistically lower than the year prior to training (2019) for *DDC Online* participants.

The provisions of Chapter 175, section 113B, of the Motor Vehicle and Traffic Laws of Massachusetts (MA) require that a driver that has had *three surchargeable incidents* within the past 24 months must be required to complete a *driver re-training program* satisfactorily to the Registrar. If the driver fails to complete the program within 90 days after notice of the requirement is sent to the driver, the Registrar will suspend the motorists' driver's license until such time as the licensee is notified of completion of the required course. Conversely, course completion within the 90 days is accepted in lieu of suspension. Prior to October 2010, the law required the driver re-training program for drivers who had accumulated five surchargeable incidents within a three year period.

A *surchargeable incident* is an "at-fault" collision/crash or conviction of a moving violation 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:

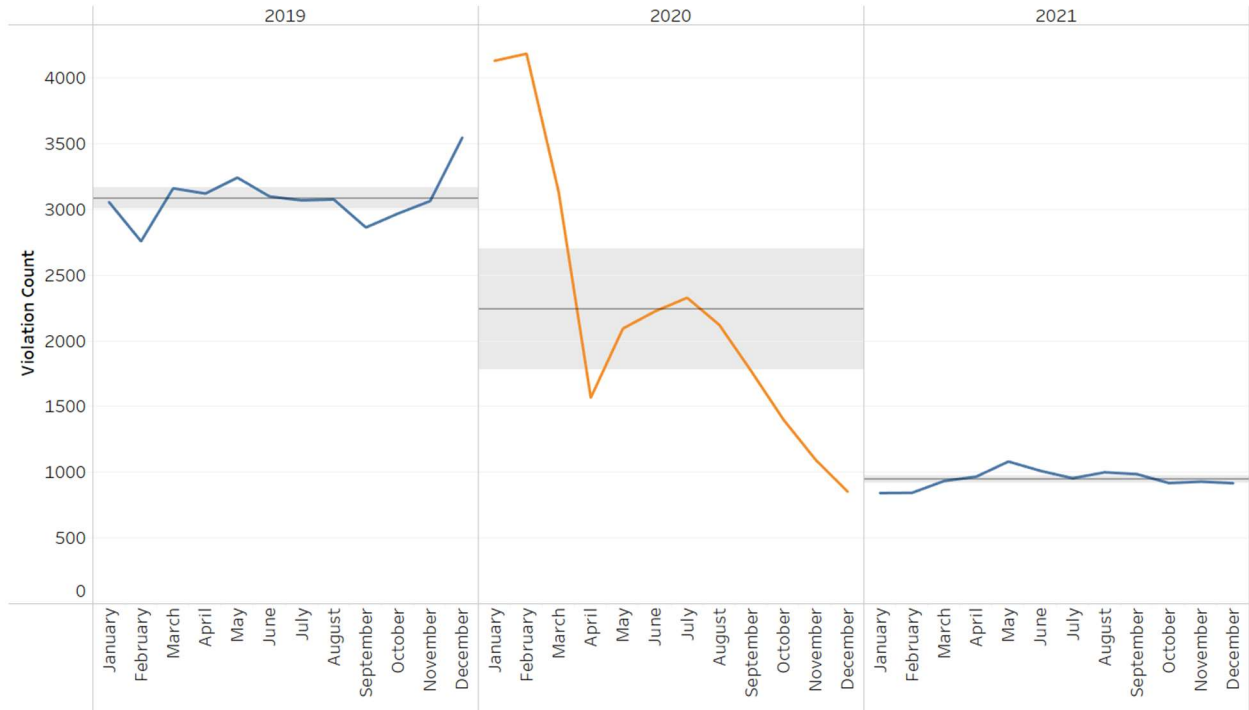
- Minor Traffic Law Violations = **2 points**
- Minor Accidents (at fault in excess of 50%):
(between \$501 and \$2001 property damage/collision/bodily injury coverage) = **3 points**
- Major Accidents (at fault in excess of 50%):
(exceeds \$2001 property damage/collision/bodily injury coverage) = **4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

DDC Online is a highly-engaging course that has modernized content, a state-of-the-art look and feel, and is highly interactive. The course was developed to be simple and streamlined so each user is able to understand all life-saving concepts. The course presents real-life driving situations, hazard recognition scenarios, and defensive driving techniques to motivate drivers to change risky driving habits and behaviors to avoid collisions and traffic violations. The course features adaptive curriculum tailored to the participant's profile, including age, gender, driving behaviors and attitudes, vehicle, and geographic location based on a series of responses to questions asked throughout the course. It is offered in English and Spanish.

The findings presented in this report are limited to those drivers who attended only *DDC Online* during the 2020 calendar year. Violation experience of these 31,654 drivers was analyzed from January 1, 2019 to December 31, 2021. This timeframe allows for the capturing of violations one year before and after the 2020 training year. During this timeframe, the 31,654 drivers received 99,368 violations. A graphic depiction of the number of violations during this three-year period is provided in Figure 1. As can be clearly seen, drivers received dramatically fewer violations the year following the training year than in 2019. This report documents the analysis

conducted by NSC to assess changes in violation rates before and after participation in the *DDC Online* program.

Figure 1. Monthly Violations One Year Before and After Training Year



Method

NSC sent the Massachusetts Registry of Motor Vehicles (RMV) a computerized list of drivers who completed the *DDC Online* course. These drivers attended the course during the 2020 calendar year (January 1 through December 31). The RMV provided a computerized list containing the motor-vehicle records (MVRs) of 31,654 drivers with matching Surrogate IDs.

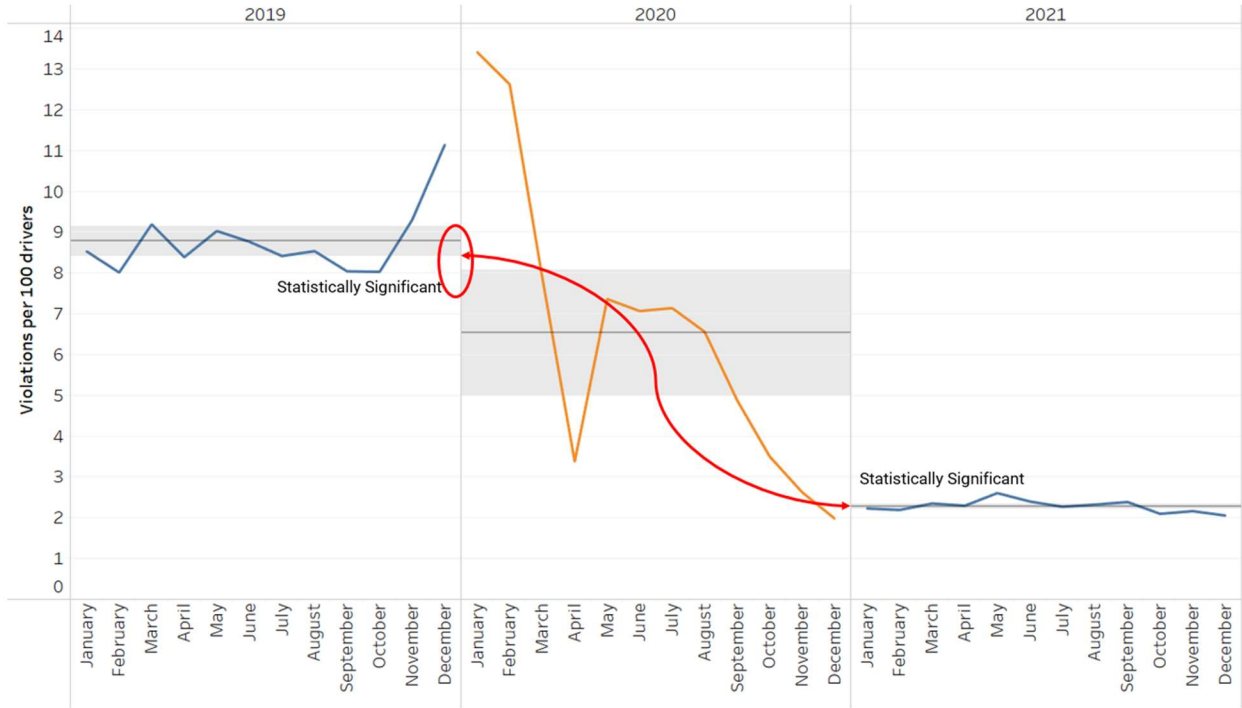
The course participant MVR data used in this study were as follows:

- Surrogate ID
- Gender
- Birthdate
- Training date
- Incident date
- HTO weight
- Major/Minor traffic violation code
- Surchargeable violation indicator
- Violation description

All analyses were conducted using Tableau 2022.4. Statistical significance is assessed by comparing confidence intervals. When two confidence intervals overlap with one another, the difference between the means should not be considered statistically significant. When confidence intervals are adjusted to 83%, non-overlapping confidence intervals represent a statistically significant difference between the means at the $p < 0.05$ level (Bolker, 2015; Goldstein & Healy, 1995). A significance level of 0.05 is used for all statistical tests (i.e., a requirement of at least 95% probability that differences were not due to chance alone). The following conclusions can be made using Figure 2:

- The confidence intervals between 2019 and 2020 do not overlap, indicating significantly lower violation rates in 2020 than in 2019.
- The confidence intervals between 2019 and 2021 do not overlap, indicating significantly lower violation rates in 2021 than in 2019.

Figure 2. Comparison of Confidence Intervals for Total Violation Rates One Year Before and After Training Year



Results

Demographics

The mean age of the 31,654 *DDC Online* participants was 30.5. About 69% of training participants are male (69.6%) and 30.4% are female (see Table 1).

Table 1. Number and Percentage of *DDC Online* Participants by Gender and Age

Age Group	Gender					
	Male		Female		TOTAL	
	Number	%	Number	%	Number	%
Under 21	1,750	5.5%	664	2.1%	2,414	7.6%
21-64	19,599	61.9%	8,667	27.4%	28,266	89.3%
65 and older	669	2.1%	305	1.0%	974	3.1%
TOTAL	22,018	69.6%	9,636	30.4%	31,654	100.0%

Most drivers only completed one training event in 2020 (78.0% of the *DDC Online* participants). Ninety-seven percent of drivers completed three or fewer training events during 2020.

Table 2. Number and Percentage of Training Events

Number of Training Events	Number	%
1	24,682	78.0%
2	4,783	15.1%
3	1,362	4.3%
4	491	1.6%
5	204	0.6%
6	71	0.2%
7	26	0.1%
8	18	0.1%
9	8	0.0%
10	4	0.0%
11	2	0.0%
12	1	0.0%
14	1	0.0%
16	1	0.0%
TOTAL	31,654	100.0%

Comparison of Violations Before and After Training

Overall Impact of Training

The first set of analyses explores the impact of *DDC Online*, combining all driver demographic groups. Because participation in training is triggered by the accumulation of surchargeable events, the analysis first focuses on the impact of training on surchargeable events. As shown in Figure 3, drivers experienced lower monthly average violation rates per 100 drivers in the year following training (2021) compared to the year before training (2019). As discussed previously, statistical significance is identified when the confidence intervals between years or groups do not overlap.

Figure 3 also shows that drivers experienced a violation peak in January and February 2020. The timing of this peak is consistent with the timing of when the courses were completed. The January and February 2020 peak is consistent with *DDC Online* participation taking place from April through December 2020.

Figure 3. Average Monthly Surchargeable Violations per 100 Drivers One Year Before and After Training Year

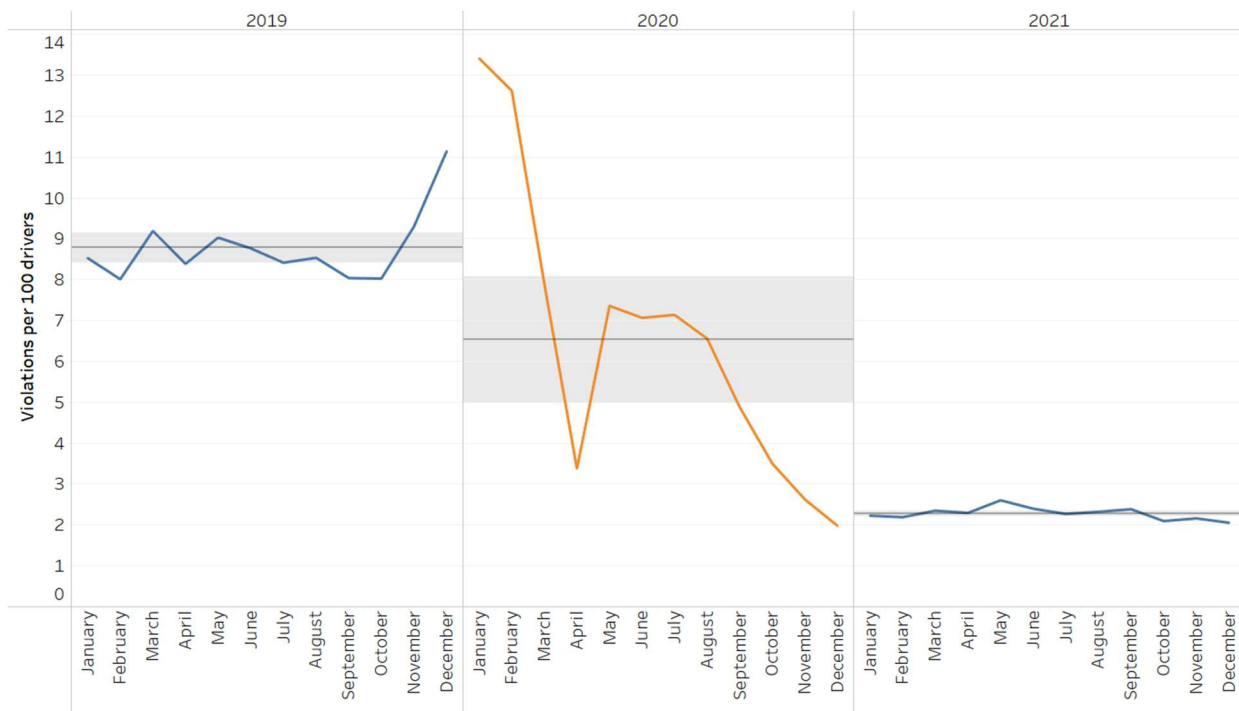


Table 3 expands on the analysis illustrated in Figure 3 by assessing the impact on average monthly violation rates for total violations, minor violations, major violations, as well as surchargeable violations. Using Table 3, the following conclusions can be made:

- Participants achieved significantly lower violation rates for all violation types in the year after training compared to the year before training:
 - Total violation rates decreased 71% from 2019 to 2021.
 - Minor violation rates decreased 74% from 2019 to 2021.
 - Major violation rates decreased 38% from 2019 to 2021.

- Surchargeable violation rates decreased 74% from 2019 to 2021.

Table 3. Comparison of Average Monthly Violation Rates per 100 Drivers One Year Before and After Training Year

One Year Before		One Year After		Before - After % Dif.*
Average	Confidence Interval	Average	Confidence Interval	
Total Traffic Violations				
12.88	12.47 - 13.28	3.78	3.66 - 3.90	-71%
Minor Traffic Violations				
4.01	3.90 - 4.12	1.05	0.99 - 1.11	-74%
Major Traffic Violations				
0.52	0.46 - 0.55	0.32	0.27 - 0.37	-38%
Surchargeable Violations				
8.78	8.42 - 9.15	2.28	2.22 - 2.34	-74%

* **Bold** indicates statistically significant ($p < 0.05$).

Impact of Training by Gender

Next, the analyses explores the impact of training by gender. As shown in Figure 4, both male and female drivers achieved significantly lower monthly average surchargeable violation rates per 100 drivers in the year following training (2021) compared to the year before training (2019).

The following conclusions can be made using Table 4:

- Both males and females benefited from training.
 - Male drivers achieved a 72% decrease.
 - Female drivers achieved a 79% decrease.

Figure 4. Comparison of Average Surchargeable Violations per 100 Drivers One Year Before and After by Gender

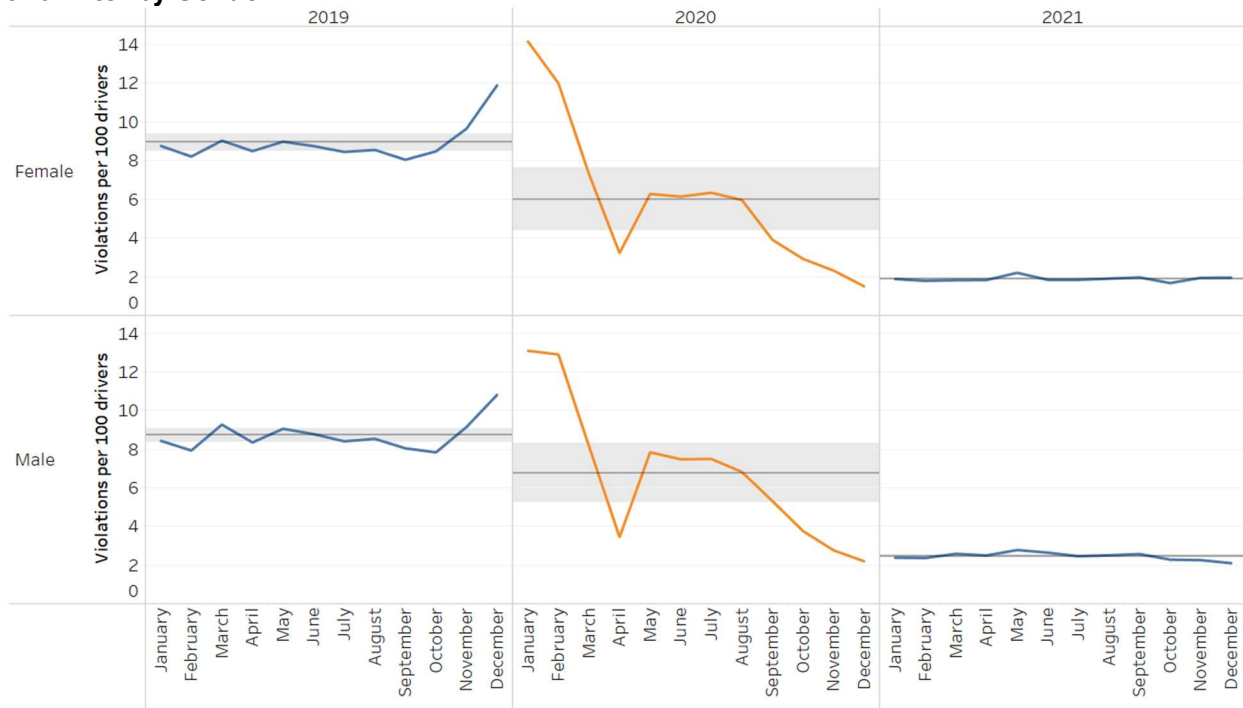


Table 4. Comparison of Average Monthly Surchargeable Violation Rates per 100 Drivers One Year Before and After by Gender

One Year Before		One Year After		Before - After % Dif.*
Average	Confidence Interval	Average	Confidence Interval	
All Drivers				
8.78	8.42 - 9.15	2.28	2.22 - 2.34	-74%
Male drivers				
8.72	8.37 - 9.06	2.45	2.37 - 2.53	-72%
Female drivers				
8.93	8.50 - 9.36	1.89	1.83 - 1.94	-79%

* **Bold** indicates statistically significant ($p < 0.05$).

Impact of Training by Driver Age Group

Drivers were segmented into three age groups (Under 21, 21-64, and 65 and older). As shown in Figure 5, all three age groups experienced statistically lower monthly average surchargeable violation rates per 100 drivers the year following training (2021) compared to the year before training (2019).

The following conclusions can be made using Table 5:

- All three age groups benefited from training.

- Drivers under 21 years old achieved a 68% decrease.
- 21 to 64 year old drivers achieved a 74% decrease.
- 65 and older drivers achieved an 85% decrease.

Figure 5. Comparison of Average Surchargeable Violations per 100 Drivers One Year Before and After by Age Group

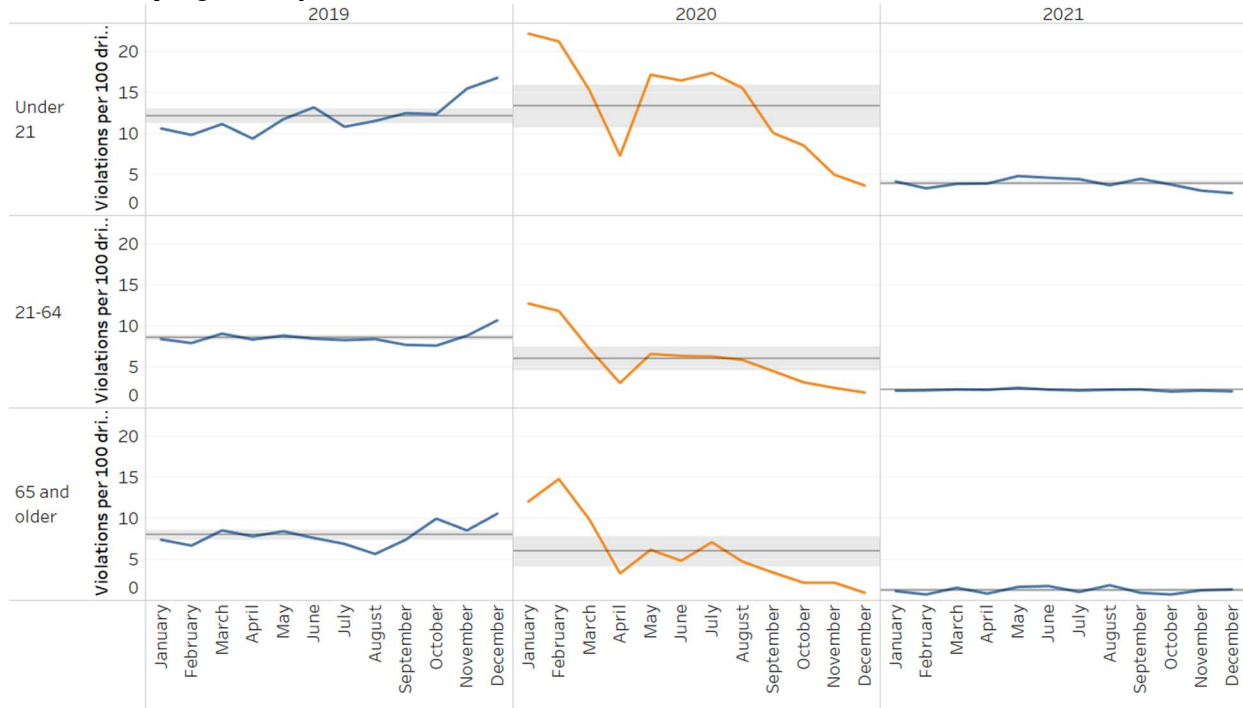


Table 5. Comparison of Average Surchargeable Violations per 100 Drivers One Year Before and After by Training Method and Age of Driver

One Year Before		One Year After		Before - After % Dif.*
Average	Confidence Interval	Average	Confidence Interval	
All Drivers				
8.78	8.42 - 9.15	2.28	2.22 - 2.34	-74%
Under 21				
12.1	11.17 - 13.03	3.9	3.63 - 4.17	-68%
21 to 64				
8.53	8.18 - 8.87	2.18	2.13 - 2.23	-74%
65 and older				
7.95	7.34 - 8.53	1.23	1.06 - 1.40	-85%

* **Bold** indicates statistically significant ($p < 0.05$).

Impact of Training by Number of Training Events Completed

An analysis was conducted to compare the impact of training by the number of training events completed in 2020. Because 97% of drivers in this study completed three or fewer training events in 2020, this analysis focuses on comparing the impact of participating in one to three training events. As shown in Figure 6 and Table 6, regardless of the number of training events completed, drivers experienced statistically lower monthly average surchargeable violation rates per 100 drivers the year following training (2021) compared to the year before training (2019).

The following conclusions can be made using Table 6:

- Drivers benefited from training regardless of the number of training events completed in 2020.
 - Drivers who completed one *DDC Online* training event achieved a 73% decrease.
 - Drivers who completed two *DDC Online* training events achieved a 75% decrease.
 - Drivers who completed three *DDC Online* training events achieved a 76% decrease.

Figure 6. Comparison of Average Surchargeable Violations per 100 Drivers One Year Before and After by Number of Training Events completed

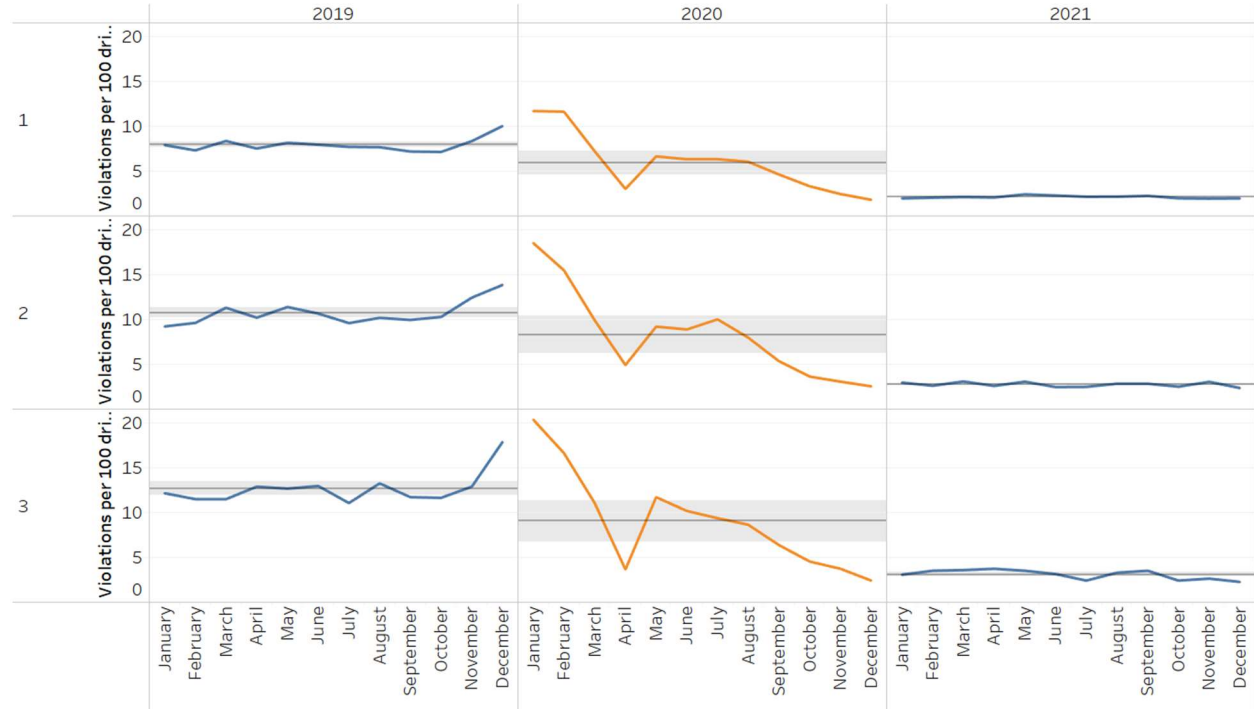


Table 6. Average Surchargeable Violations per 100 Drivers One Year Before and After by Number of Training Events Completed

One Year Before		One Year After		Before - After % Dif.*
Average	Confidence Interval	Average	Confidence Interval	
All Participants				
8.78	8.42 - 9.15	2.28	2.22 - 2.34	-74%
Participants Completing a Total of One Training Event				
7.96	7.63 - 8.29	2.12	2.05 - 2.18	-73%
Participants Completing a Total of Two Training Events				
10.75	10.18 - 11.32	2.74	2.63 - 2.86	-75%
Participants Completing a Total of Three Training Events				
12.71	11.95 - 13.47	3.11	2.89 - 3.33	-76%

* **Bold** indicates statistically significant ($p < 0.05$).

Impact of Training on Crash Rates

The final analysis compares crash-related traffic violations before and after exposure to the *DDC Online* course. A violation was categorized as crash-related if it had one of three violation descriptions:

- Property Damage Liability
- Collision
- Bodily Injury Liability

As shown in Figure 7 and Table 7, drivers experienced statistically lower monthly average crash-related surchargeable violation rates per 100 drivers the year following training (2021) compared to the year before training (2019).

The following conclusions can be made using Table 7:

- Drivers experienced lower crash-related surchargeable violation rates the year following training.
 - Drivers completing *DDC Online* training achieved a 71% decrease.

Figure 7. Average Number of Monthly Crash-Related Surchargeable Violations per 100 Drivers One Year Before and After

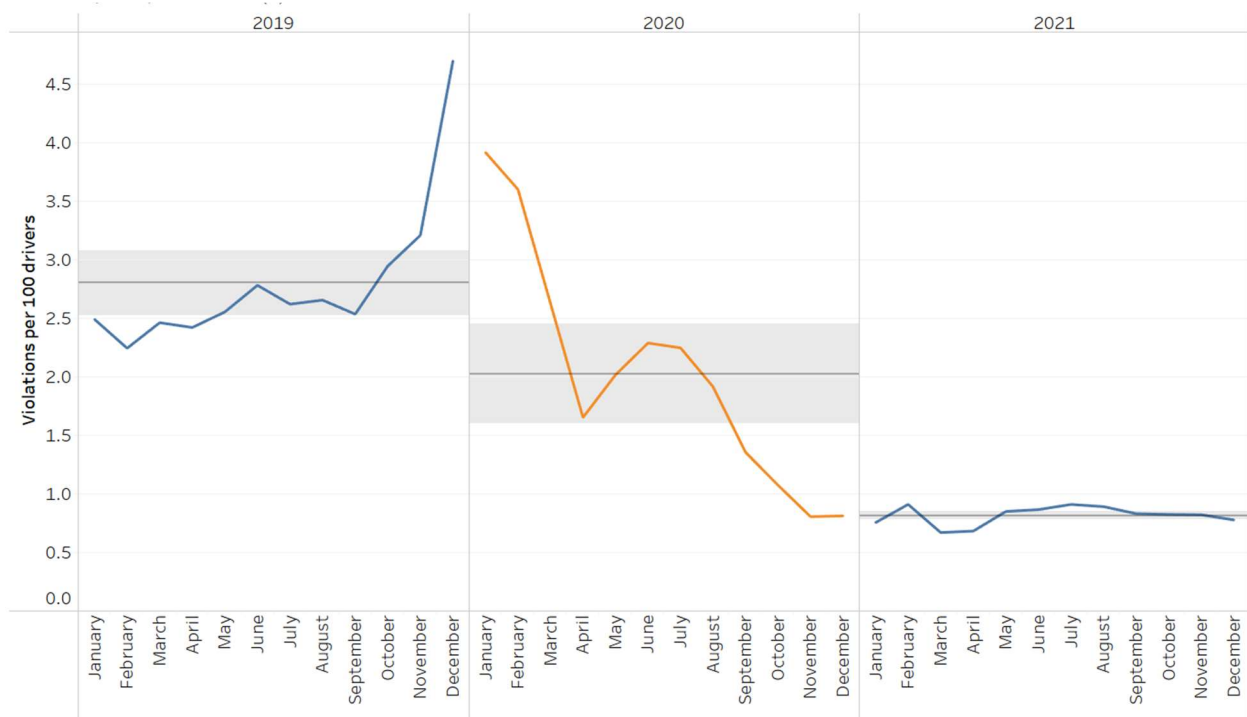


Table 7. Comparison of Average Number of Monthly Crash-Related Surchargeable Violations per 100 Drivers One Year Before and After by Training Method

One Year Before		One Year After		Before - After % Dif.*
Average	Confidence Interval	Average	Confidence Interval	
2.8	2.53 - 3.08	0.82	0.78 - 0.85	-71%

* **Bold** indicates statistically significant ($p < 0.05$).

Summary

In summary, based on the information made available by the Commonwealth of Massachusetts RMV, participants in the *DDC Online* program showed statistically significant reductions in total, minor, major, surchargeable, and crash-related violation rates the year following training than they did the year before training. These reductions were significant across all driver demographic subgroups.

These results highlight a very important aspects of the *MA Driver Re-Training Program* during 2020:

- The shift from *DDC ADD* to *DDC Online* in response to public health concerns provided drivers with an effective alternative training program. Drivers exposed to *DDC Online* in 2020 experienced significantly lower violation rates the year following training than they did the year before training.

The improvement demonstrated following training was consistent, regardless of the number of training events completed in 2020. Drivers who completed one *DDC Online* training event in 2020 had an average monthly surchargeable violation rate of 7.96 per 100 drivers the year before training and demonstrated a 73% decrease in violations the year following training. Drivers who completed three *DDC Online* training events had an average monthly surchargeable violation rate of 12.71 per 100 drivers the year before training and demonstrated a 76% decrease in violations the year following training.

REFERENCES

Bolker, B. (2015). *Overlapping confidence intervals*. Accessed on 12/4/2020 at: https://rstudio-pubs-static.s3.amazonaws.com/132971_a902bb2b962b407e9e9436559c6f5d36.html .

Goldstein, H. & Healy, M. (1995). The Graphical Presentation of a Collection of Means. *Journal of the Royal Statistical Society, 158 Part 1*, pp. 175-177.