

**Study of Recidivism Rates among Drivers Administratively Sanctioned
by the New Jersey Motor Vehicle Commission**

FINAL REPORT
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<p>16. Abstract</p> <p>The purpose of this study was to examine the current state of practice related to driver improvement countermeasures used in the United States and to assess the effectiveness of New Jersey's negligent driver interventions. As part of the study, the research team conducted a national literature review and a survey of motor vehicle agency policies in other states to document the current state of practice related to driver improvement programs and the current state of knowledge regarding the effectiveness of specific countermeasures. In addition, the research team obtained and analyzed an extensive longitudinal database of driver history records to examine the effectiveness of various countermeasures used in New Jersey to address negligent driver behavior relative to violation and crash recidivism.</p> <p>This study provides important evidence that New Jersey's program of negligent driver countermeasures is effective at reducing violation and crash recidivism among most negligent driver subgroups in the two-year period after Motor Vehicle Commission (MVC) intervention. Of the countermeasures used in New Jersey, the combination of license suspension with one-year probation resulted in the greatest overall reduction in both mean violation and crash rates. New Jersey's driver re-education classes, which are accompanied by a three-point credit against accumulated demerit points and one-year probation, resulted in the lowest mean violation rate reduction. Point advisory notices, which for experienced drivers are accompanied by a concurrent assessment of negligent driver fees (MVC "insurance surcharges"), appear to be an effective early intervention, producing substantial reductions in both violation and crash recidivism among all driver subgroups except teen drivers who are not assessed negligent driver fees at the time of notice issuance.</p> <p>Several policy recommendations can be derived from this research. First, with regard to teen drivers, consideration should be given to whether or not a "zero-tolerance" policy for motor vehicle violations and at-fault crashes should be applied to teen drivers. It may be appropriate to impose license suspension as an earlier intervention if the reforms already enacted do not result in meaningful change in teen driver safety outcomes. Second, MVC should consider streamlining the suspension program to make it more straightforward and easier to administer. Thirdly, consideration should be given to reviewing and reforming, New Jersey's driver monitoring system and/or plea bargaining practices to ensure that repeat traffic offenders are not able to use zero-point plea bargaining to avoid corrective actions that improve safety outcomes.</p>			
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EXECUTIVE SUMMARY

According to United States Department of Transportation statistics, there were more than 37,300 highway fatalities on U.S. roadways in 2008 ⁽¹⁾. In New Jersey, there were approximately 259,000 motor vehicle crashes, including 65,000 that involved injuries and 526 involving fatalities ⁽²⁾. Consequently, improving highway safety and preventing crashes is an important public health and policy objective at the state and national level.

Research has consistently shown that drivers who repeatedly violate motor vehicle laws pose higher public safety risks ^(3,4,5). In New Jersey, the Motor Vehicle Commission (MVC) utilizes a demerit point system to monitor driver behavior and has a program of negligent driver countermeasures that become progressively more severe based on the accumulation of demerit points. The countermeasures used in New Jersey vary based on the number and severity of violations and driver experience (e.g., teen vs. experienced drivers). The three primary countermeasures include: point advisory notices, driver improvement classes, and license suspension. Secondary components include: negligent driver fees (MVC “insurance surcharges”) that are assessed concurrent with point advisory notices; point credits that accompany successful completion of MVC’s driver re-education classes; and, one-year probation periods that are imposed after completion of a driver re-education class and license suspension.

Although this system of negligent driver countermeasures has been in place for several decades, little is known regarding the effectiveness of these countermeasures in terms of highway safety outcomes. Research is needed to examine the effectiveness of New Jersey’s negligent driver improvement program in terms of reducing violation and crash recidivism among negligent drivers subjected to countermeasures.

The purpose of this study was to examine the current state of practice related to driver improvement countermeasures in the United States and to assess the effectiveness of New Jersey’s negligent driver interventions. As part of the study, the research team conducted a review of national literature and a survey of motor vehicle agency policies in other states to document the current state of practice related to driver improvement programs and the current state of knowledge regarding the effectiveness of specific countermeasures. In addition, the research team obtained and analyzed an extensive longitudinal database of driver history records to examine the effectiveness of various countermeasures used in New Jersey to address negligent driver behavior relative to violation and crash recidivism.

A review of national literature on negligent driver countermeasures and state driver improvement program practices indicated that New Jersey’s program of driver improvement is in the mainstream of current practice. Further, the literature on countermeasure effectiveness over the past 50 years confirmed that negligent driver

interventions can be an effective means to reduce violation and crash recidivism among many negligent driver subgroups.

Key Findings

The following is a summary of key findings from this research:

- Overall, violation recidivism in New Jersey is highest among young drivers (ages 18-24). 60 percent of male drivers and 44 percent of female drivers in this age group had more than one violation recorded in their driving history during the period that they were between the ages of 18 and 24. 32 percent of teen male drivers and 19 percent of teen female drivers received more than one violation in their first 1-2 years of driving. Recidivism rates are lowest among drivers 85 years and older. (See Table 14).
- If violation rates are normalized to adjust for variation in exposure years, the group of drivers with the highest rate of recidivism is teen male drivers. Teen male drivers have rates of violation recidivism 800 percent to 2,100 percent higher than other driver subgroups. (See Table 14).
- Crash recidivism rates ranged from a low of nine percent among teen female drivers to a high of 25 percent among young male drivers. (See Table 15).
- If crash rates are normalized to adjust for variation in exposure years, the group of drivers with the highest rate of crash recidivism is teen male drivers. Teen male drivers have rates of crash recidivism 40 percent to 600 percent greater than other subgroups. (See Table 15).

Point Advisory Notice + Negligent Driver Fee

- Analysis results indicate that MVC's point advisory notices accompanied by negligent driver fees, which are assessed to experienced drivers receiving a point advisory notice, are an effective means of reducing violation recidivism for most negligent driver subgroups for at least some period of time after the intervention is imposed. Point advisory notices issued to teen drivers, which are not accompanied by negligent driver fees, appear to be ineffective for male teen drivers. (See Table ES1 and Table 18).
 - A comparison of violation rates in the two-year period before and after drivers receive a point notice reveals that mean violation rates among drivers in all driver subgroups except male teen drivers decrease substantially (29-65 percent) in the two-year period following intervention.

The observed rate reductions for all driver subgroups except male teen drivers were statistically significant. (See table ES1 and Table 18).

- The analysis indicates that point notices + fees are most effective for older female drivers and young female drivers. These groups exhibited mean rate reductions of 65 percent and 62 percent respectively. (See Table ES1 and Table 18).
- The analysis provided no statistical evidence that point notices are effective for male teen drivers. In fact, the mean rate of violation actually increased (12 percent) for this subgroup in the two-year period after intervention. (See Table ES1 and Table 18).
- The mean time lag between when drivers received a point notice + fee and when they committed their next violation was approximately 295 days for young and older drivers and 290 days for teen drivers. This difference was not statistically significant.

Table ES1. Percent change in mean violation and crash rates in two-year period after MVC intervention

Age Group	Gender	Point Notice + Negligent Driver Fee		Driver Re-education Class + Point Credit +1-year Probation		License Suspension + 1-year Probation	
		Violation	Crash	Violation	Crash	Violation	Crash
Young Drivers	F	-62%	-29%	-64%	-33%	-70%	-56%
	M	-53%	-25%	-56%	-29%	-65%	-56%
Older Drivers	F	-65%	-15%	-56%	-23%	-62%	-41%
	M	-58%	-07%	-53%	-10%	-61%	-42%
Teen Drivers ¹	F	-29%	28%	-54%	07%	-64%	-44%
	M	12%	68%	-35%	06%	-59%	-31%

Note: 1 - The “trigger” for a point advisory notice issued to probationary (teen) drivers is the accumulation of four points. Point advisory notices issued to probationary drivers are not accompanied by fees unless the driver accumulates six or more points.

- Analysis results indicate that point notices + fees are also an effective means of reducing crash recidivism among young and older drivers of both genders but notices are not effective for teen drivers of either gender. The observed reduction rates are generally lower than those observed for violation recidivism. (See Table ES1 and Table 19).

- A comparison of crash involvement rates in the two-year period before and after drivers receive a point notice + fee reveals that crash involvement rates among young and older drivers of both genders decrease between 7 and 29 percent. These rate differences were statistically significant. (See Table ES1 and Table 19).
- Point notices appear to be of limited effectiveness among teen drivers of either gender in terms of reducing crash recidivism. In both subgroups post-intervention crash rates were observed to be higher in the period after intervention. However, the observed rate differences were not statistically significant, making the results inconclusive. (See Table ES1 and Table 19).
- Mean time lag for drivers involved in a crash within the two-year period after receiving a point notice + fee was approximately 328 days for young and older drivers and 342 days for teen drivers. The difference in time lag between groups was not statistically significant.

Driver Re-education Classes + Point Credit + Probation

- Analysis results indicate that driver re-education classes combined with a point credit and one year probation (referred to as driver re-education class only) appear to be an effective means of reducing violation recidivism for all negligent driver subgroups for at least some period of time after the intervention is imposed.
 - A comparison of violation rates in the two-year period before and after completion of a driver re-education class reveals that mean violation rates among drivers in all driver subgroups decrease substantially in the two-year period following intervention. Mean rate reductions range from 35 to 64 percent. In all cases the rate differences were statistically significant. (See Table ES1 and Table 20).
 - Driver re-education classes appear to be most effective for young female drivers, which exhibited mean rate reductions of 64 percent; about equally effective for young male, teen female and older drivers of both genders, which exhibited mean rate reductions of 53 to 56 percent; and least effective for teen male drivers which had the lowest rate of observed change (35 percent). (See Table ES1 and Table 20).
 - The mean time lag between when drivers completed a driver re-education class and when they committed their next violation was approximately 306

days for young and older drivers and 298 days for teen drivers. This time lag difference was not statistically significant.

- Analysis results on the effectiveness of driver re-education classes in terms of crash recidivism were less conclusive.
 - A comparison of crash rates in the two-year period before and after drivers successfully completed either The Driver Improvement Program (DIP) or Probationary Driver Program (PDP) class showed that mean crash involvement rates among young and older drivers of both genders decreased in the two-year period following intervention; however tests of statistical significance (at the 5 percent confidence level) showed significant variability. The rate differences were statistically significant for only young drivers of both genders and female older drivers, not older male drivers or teen drivers of either gender. The latter two groups exhibited an increase in mean crash rates in the two years after completing the PDP class. This suggests that the value of the driver re-education classes in terms of reducing subsequent crashes among certain driver subgroups may be limited. (See Table ES1 and Table 21).
 - The calculated mean time lag for drivers involved in a crash within the two-year period after completing a driver re-education class was approximately 325 days for young and older drivers and 337 days for teen drivers. The difference in observed lag time was not statistically significant.

[Note: When interpreting the study results, it should be noted that during the course of the study the curriculum for the PDP class was substantially revised. The driver history data used for this study predates the curriculum revisions and therefore reflects the effectiveness of the earlier class curriculum.]

Driver's License Suspension + One Year Probation

- Analysis results indicate that license suspension accompanied by a probation period of one year (hereinafter referred to as license suspension only) is the most consistently effective means used in New Jersey of reducing both violation and crash recidivism among all negligent driver subgroups. (See Table ES1 and Table 22).
 - A comparison of violation rates in the two-year period before and after driver's license suspension reveals that mean violation rates among drivers in all driver subgroups decrease substantially (59 to 70 percent) in

the two-year period following intervention. For all driver subgroups the rate differences were highly statistically significant. (See Table ES1 and Table 22).

- License suspension appears to be somewhat more effective for female drivers and young drivers of both genders, but mean rate reductions are very similar among all subgroups. (See Table ES1 and Table 22).
- A comparison of crash involvement rates in the two-year period before and after license suspension was similarly clear. Mean rate reductions ranged from 31 to 56 percent. In all cases the observed mean crash rate differences were statistically significant. The greatest reduction in crash rates was observed for young drivers of both genders (56 percent). Similar but somewhat lower reductions were observed for the other driver subgroups (41 to 44 percent). Teen male drivers demonstrated the lowest mean crash rate reduction (31 percent). (See Table ES1 and Table 23).
- The mean time lag for drivers involved in a crash within the two-year period after license suspension was approximately 343 days for young and older drivers and 367 days for teen drivers. This difference was not statistically significant and was slightly longer than the time lag observed for point advisory notices and driver re-education classes.

Comparison of Countermeasure Effectiveness

- An analysis comparing the effectiveness of the three primary countermeasures combined with their secondary components relative to one another indicated that the differences in mean rate reductions provided by each countermeasure are statistically significant at the 0.05 confidence level. License suspension combined with one-year probation results in the greatest overall reduction in mean violation rates in the two-year period after intervention. Driver re-education classes combined with a point credit and one-year probation results in the lowest mean violation rate reduction. The same is true for crash rates.
- The same test found no statistically significant difference between the effectiveness of various levels of suspensions (i.e., A, B, C, persistent violator, and probationary driver) when compared to one another.

A note of caution should be considered when interpreting the results of this study. The nature of our comparison groups is such that they are all by definition negligent drivers. They therefore most likely exhibit higher rates of violation and crash involvement than the general population of drivers in the State. In statistical terms, groups on the

extreme ends of a normal population distribution have sometimes been observed to perform more like the “normal” population in any given comparison period just by chance. This phenomenon is called regression-to-the-mean. Thus, it could be true that some portion of the observed rate change documented in this study is due to regression-to-the-mean effects. Absent a true control group from which to compare before and after effects, it is not possible to discern how much, if any, of the observed rate differences documented in this study are due to regression-to-the-mean. It seems clear, however, from the results that there is strong evidence indicating that the negligent driver countermeasures used in New Jersey are effective at reducing violation and crash recidivism among most negligent driver subgroups.

Discussion and Conclusions

This study provides important evidence that New Jersey’s program of negligent driver countermeasures is effective at reducing violation and crash recidivism among most negligent driver subgroups in the two-year period after MVC intervention. Of the countermeasures used in New Jersey, the combination of license suspension with one-year probation resulted in the greatest overall reduction in both mean violation and crash rates. New Jersey’s driver re-education classes which are accompanied by a 3-point credit against accumulated demerit points and one-year probation resulted in the lowest mean violation rate reduction. Point advisory notices which are accompanied in New Jersey by a concurrent assessment of negligent driver fees (MVC “insurance surcharges”) appear to be an effective early intervention, producing substantial reductions in both violation and crash recidivism among all driver subgroups except teen drivers. These results are generally consistent with the findings from past studies conducted in other states.

Several policy recommendations can be derived from this research. First, with regard to teen drivers, it appears that license suspension combined with one year probation is the most effective countermeasure that consistently reduces violation and crash recidivism among teen drivers in the same order-of-magnitude as other driver subgroups. This is especially true when examining the effect of countermeasures on the driving performance of male teen drivers.

Recent reforms enacted to enhance New Jersey’s system of teen driver monitoring and control merit active monitoring and on-going evaluation. However, future consideration should be given to whether or not a “zero-tolerance” policy for motor vehicle violations and at-fault crashes should be applied to teen drivers. Despite the generally accepted practice of imposing progressively harsh sanctions against drivers who continue to exhibit negligent driving behavior, it may be appropriate to impose license suspension as an earlier intervention if the reforms already enacted don’t result in meaningful change in teen driver safety outcomes.

Second, the results of the analysis indicate that the complex current structure of the MVC license suspension program which includes seven categories of suspension, may be confusing and cumbersome. MVC should consider streamlining the suspension program to make it more straightforward and easier to administer.

Third, as documented in a study recently completed for MVC, it is important to note that there has been a downward trend in the number of drivers subjected to MVC negligent driver countermeasures since 2000. This is most likely due to an increase in zero-point plea bargaining of motor vehicle offenses observed over the same period ⁽³⁸⁾. Given this finding, consideration should be given to reviewing and reforming, as necessary, New Jersey's driver monitoring system and/or plea bargaining practices to ensure that repeat traffic offenders are not able to use zero-point plea bargaining to avoid corrective actions that improve safety outcomes.

INTRODUCTION

According to United States Department of Transportation statistics, there were more than 37,300 highway fatalities on U.S. roadways in 2008 ⁽¹⁾. In New Jersey, there were approximately 259,000 motor vehicle crashes, including 65,000 that involved injuries and 526 involving fatalities in 2008 ⁽²⁾. Improving highway safety and preventing crashes is an important public health and policy objective at the state and national level. There are many ways to reduce highway crashes. For example, road engineering solutions such as the installation of median barriers and guardrails have improved the safety of roadway infrastructure. Vehicle safety and design enhancements such as airbags have made motor vehicles safer to drive. Public and driver education initiatives have been successful at dramatically increasing seat belt use. Tougher laws and increased enforcement across the country has significantly reduced the incidence of driving under the influence of drugs and alcohol.

A common theme that runs through most of these approaches is the important role that human factors play in the highway safety equation. Part of the human factors influence on highway safety relates to driver behavior and compliance with motor vehicle laws. Research has consistently shown that drivers that repeatedly violate motor vehicle laws pose higher public safety risks ⁽³⁾. Further, a variety of researchers have shown that negligent drivers account for two to four times their share of traffic accidents ^(4,5). Consequently, motor vehicle administrators in every state in the country have some system of post-licensure driver monitoring and control in place and impose sanctions on repeat traffic offenders.

In New Jersey, the Motor Vehicle Commission (MVC) utilizes a demerit point system to monitor driver behavior and a program of negligent driver countermeasures that become progressively more severe based on the accumulation of demerit points. The countermeasures used in New Jersey vary based on the number and severity of violations and driver experience (e.g., teen vs. experienced drivers). The three primary countermeasures include: point advisory notices, driver re-education classes, and license suspension. Secondary components include: negligent driver fees (MVC "insurance surcharges") that are assessed concurrent with point advisory notices; point credits that accompany successful completion of MVC's driver re-education classes; and a one year probation period that is imposed after completion of a driver re-education class and license suspension.

Drivers in New Jersey may also request a pre-suspension hearing before an administrative law judge as well as a pre-hearing conference with MVC driver control personnel to explore alternatives to license suspension. Drivers participating in driver re-education classes and those that have their driving privileges restored following a suspension are placed on probation for one year. As part of the probation process, drivers receive a warning letter from MVC advising them of the probationary period and the consequences of committing another motor vehicle violation during probation.

Although this system of negligent driver countermeasures has been in place for a number of decades, little is known regarding the effectiveness of these countermeasures. Research is needed to examine the effectiveness of New Jersey's negligent driver improvement program in terms of reducing violation and crash recidivism among drivers subjected to countermeasures.

The purpose of this study was to generally examine the current state of practice related to driver improvement countermeasures in the United States and to specifically assess the effectiveness of New Jersey's negligent driver countermeasures. As part of the study, the research team conducted a review of national literature and a survey of motor vehicle agency policies in other states to document the current state of practice related to driver improvement programs and the current state of knowledge regarding the effectiveness of specific countermeasures. This included a review of articles published in academic journals as well as studies and reports published by various governmental agencies and other non-academic sources.

In addition, the research team conducted a series of interviews with MVC staff and reviewed New Jersey statutes and regulations to ensure a comprehensive understanding of the program of driver improvement interventions and sanctions used in the state. Finally, the research team obtained and analyzed an extensive longitudinal database of New Jersey driver history records to examine the effectiveness of various negligent driver countermeasures used by MVC relative to violation and crash recidivism.

POST-LICENSURE DRIVER MONITORING AND CONTROL

Background

All states monitor driver behavior after licensure to ensure drivers continue to drive safely. “Motor vehicle agencies in every state also use various countermeasures to address the problem of repeat traffic offenders. Although most states use a point-based system to monitor driver behavior, some use an occurrence-based system that monitors “countable” traffic offenses and crashes. In addition, there are a handful of states that use some combination of both point- and occurrence-based monitoring.”⁽⁶⁾

Table 1. Driver improvement countermeasures used in the United States

Advisory letters warning of subsequent action:

- Standard advisory notices.
- High threat letters.
- Low threat “soft-sell” letters (with or w/o personalization).
- Letters accompanied by educational brochure/pamphlet.

In-person contact prior to further action (with or w/o probation):

- Individual counseling.
- Group meetings.
- Goal setting programs.

Driver re-education (some targeted to different types of drivers/violators):

- Driver improvement class (with citation dismissal or point waiver).
- Driver improvement class (with no relief).
- Defensive driving class (with or w/o point relief or citation dismissal).
- Printed materials.

Driver re-examination:

- In-person re-examination (written, driving, vision or some combination).
- Self-administered test.

License suspension/revocation:

- Short duration suspensions – 14 days to 6 months or more.
- Long duration revocations – 1-5 years or more.

Probation:

- Before action probation - “second chance” extension of driving privileges in lieu of suspension if driver remains violation free during probationary period.
- After action probation.

Safe driving incentives and encouragement:

- Safe driving congratulatory letter during period of probation.
 - Point credit reward for period of safe driving.
-

Note: The list of countermeasures presented in this table was compiled from a variety of sources, including motor vehicle agency websites, a survey of state motor vehicle agency practices conducted by the research team, as well as various articles and reports. Although the list is comprehensive it should not be considered exhaustive.

The range of driver improvement countermeasures used in each state varies but all programs share a common purpose: to alter driving behavior in order to reduce violations and crash recidivism. As shown in Table 1, driver improvement countermeasures used in the United States include: various types of advisory warnings; in-person contact such as individual and/or group counseling; driver re-education, including both classes (in-person and on-line) and/or published brochures and pamphlets, some of which are targeted to different types of drivers/violators; driver re-examination; license suspension/revocation; before- and after-action probation; and, safe driving incentives and encouragement. The program of countermeasures used in most states is progressive with more severe sanctions utilized as violation and/or demerit point totals increase.

In addition to the above, most states (48 states as of 2008) now have in place a tiered system of graduated driver licensure which subjects teen drivers (15-19 year old) to stricter driver monitoring and control ⁽⁷⁾. The use of graduated driver license (GDL) programs has grown over the last decade in response to increasing public concern over teen driver crashes and fatalities. A number of recent studies have reported the effectiveness of GDL programs at reducing crash involvement among teen drivers ^(7,8,9). However, for the purpose of this study, GDL programs are not considered a driver improvement countermeasure. Instead, the circumstances under which various countermeasures are applied to teen drivers differently than more experienced drivers are noted when appropriate.

Countermeasure Effectiveness

The literature on driver improvement programs and the effectiveness of various countermeasures spans nearly six decades. A 2004 review and meta-analysis of the literature conducted by Masten and Peck ⁽³⁾ found nearly 200 driver improvement studies dating back to the 1950's. Interestingly, most of the studies that examined countermeasures aimed at negligent drivers were done prior to 1990. In the past fifteen years, research has focused almost exclusively on countermeasures targeted toward specific driver populations, namely young drivers, older drivers, and drivers convicted of operating under the influence of alcohol or drugs.

According to Masten and Peck, driver improvement program studies have generally concluded that "most types of negligent driver interventions reduce subsequent traffic violation rates for 6 to 24 months after treatment." They further documented that studies show treatment "effects" increase with the severity of intervention, with the largest effects associated with license suspension/revocation, which is generally the most severe countermeasure used by states ⁽³⁾. (See Table 2).

In terms of crash involvement, Masten and Peck found that the results of past studies show a less strong correlation between driver improvement countermeasures and crash involvement. In some cases, the interventions even appear to increase subsequent

rates of crashes. Earlier examinations of past studies found similar results ^(4,10). Specifically, Struckman-Johnson et al. estimated that driver improvement “treatments” reduced subsequent traffic violation rates between 5-10 percent following “treatment” while they reduced subsequent crashes by only about 6 percent ⁽¹⁰⁾. The estimates were based on controlled studies that compared the post-intervention violation and crash rates of drivers subjected to “treatment” and those that were not.

Table 2. Effect of countermeasures on crash and violation recidivism

Driver Improvement Countermeasure	Percent Change Traffic Violations	Percent Change Crashes
Combined	-8.28%	-6.49%
Educational info/material	-0.90%	+1.17%
Group meeting	-8.02%	-4.97%
Individual meeting	-9.70%	-7.72%
Advisory letter	-5.70%	-4.34%
License suspension/revocation	-21.37%	-17.19%
Contingent point reduction	-6.29%	-4.42%
Probation	-13.35%	+7.05%

Source: Masten and Peck 2004

Note: The effect sizes appearing the table were derived from controlled studies that compared the post-intervention violation and crash rates of drivers that received “countermeasures” and those that did not.

A brief overview of the most commonly used countermeasures and the empirical evidence regarding their effectiveness follows.

Advisory Letters

Advisory letters are used in many states as a low-cost, early intervention. Letters are used to remind drivers that their driving behavior is being monitored and to warn them that without improvement they will be subject to corrective action. Advisory letters range in form from standard recitations of driver responsibilities under the law to “high threat” letters warning of stringent consequences. They may also include “low threat” letters personalized to unique driver characteristics and circumstances. Studies examining the effectiveness of advisory letters have generally shown them to be an effective and cost-efficient means to improve the driving behavior of certain drivers ^(5,11,12,13,14).

The most comprehensive examinations of advisory letter effectiveness have been conducted in Oregon and California. In both states, the driver monitoring and improvement programs randomly withheld countermeasures from a small sample of

drivers, producing control groups at multiple levels of driver improvement program implementation. This allowed controlled evaluation of program elements over time.

In 1971, researchers at the California Department of Motor Vehicles ⁽⁵⁾ found that advisory letters were effective and that “low-threat letters were more effective than high-threat letters.” Several follow up studies in California confirmed that advisory letters were a “cost-effective” means of reducing subsequent crashes and traffic convictions although the size of the reductions appeared to decline over time from the original study. Other more recent studies have found more nuanced effects. For example, a recent study of advisory letter effectiveness was conducted by Bernie Jones in 1997 and examined various types of advisory letters used in Oregon ⁽¹²⁾. Jones found that, in general, the driver improvement advisory letters used in Oregon were effective at reducing subsequent serious violations and accidents, but not effective at preventing minor moving violations. He notes however that the effect of advisory letters varied by age and gender. For example, letters were least effective on young drivers and female drivers. He further found that the standard letter used in Oregon was somewhat more effective than an experimental “soft-sell” letter created to explore the effect of less threatening letters on subsequent violation and crash involvement ⁽¹²⁾.

Struckman-Johnson et al. ⁽¹⁰⁾ estimated that warning letters reduced future violation rates from three to 11 percent, but were less effective at reducing future crash rates. In a meta-analysis of some 59 driver improvement treatments, Masten and Peck ⁽³⁾ found similar results. Based on their analysis, letters were shown to be effective at reducing future violations and to a lesser extent future crashes. More specifically, letters were about as effective as group meetings; somewhat less effective than individual counseling and probationary license extension; more effective than contingent point reductions; and, significantly less effective than license suspension and revocation at reducing future crashes ⁽³⁾.

“Direct Driver Contact”

Over the years, many states, including New Jersey, have used some form of direct contact with problem drivers as a way to improve driver behavior ^(3,5,10). Direct contact may be by phone or in-person and can range from individualized hearings, meetings and driver improvement “goal-setting” sessions to various types of group meetings and counseling sessions.

The literature on the effectiveness of direct driver contact dates back to the 1960’s. A number of studies have shown direct contact to be effective, however, the results of various studies are mixed and show “no clear difference...between interventions involving direct contact and those not involving direct contact.” At the same time, past studies show similarly mixed results regarding the effectiveness of individual versus group contact ⁽¹⁰⁾. Overall, Masten and Peck’s meta-analysis found individual contact to be slightly more effective than group meetings. They estimated that group meetings

reduce subsequent crashes among negligent drivers by approximately 5 percent and reduce subsequent traffic convictions by approximately 8 percent. This compares to reductions of approximately 7.7 and 9.8 percent respectively for individual meetings ⁽³⁾.

As was the case with the literature on advisory notices, much of the effectiveness literature on direct driver contact is based on the California experience. A series of studies conducted by the California DMV which began in 1965 looked at a variety of group and individual counseling approaches. The purpose of the studies was to determine the comparative impact of different approaches on highway safety and cost-effectiveness. The most effective approach to emerge from early studies was a Group Education Meeting (GEM) that “emphasized accident avoidance and perceptual skills.” This type of group meeting, which replaced more costly individual meetings at the time, was used in California as the first in-person contact for most negligent drivers for nearly 20 years ⁽⁵⁾.

California studies conducted in the late 1970’s and early 1980’s found a decline in the effectiveness of the GEM as well as other components of California’s negligent driver program. In 1982, the GEM was replaced with “suspension by mail combined with an individual hearing option and license probation.” In the early 1990’s researchers in California examined whether in-person hearings could be replaced with hearings by phone. They concluded that “phone hearings were as effective as in-person hearings at reducing accidents and (traffic) convictions among negligent drivers.” Subsequent studies, conducted in the late 1990’s, found similar results ⁽⁵⁾.

Driver Improvement Training and Re-Education

Another major component of driver improvement programs in the vast majority of states is negligent driver re-education ^(4,15). Driver improvement training and re-education activities in the U.S. vary from state to state but fall broadly into two categories—programs designed to improve defensive driving skills and prevent crashes and programs designed to prevent future violations by enhancing driver knowledge of motor vehicle laws and changing driver attitudes and behavior ⁽⁴⁾.

Although, driver improvement training and re-education is a significant component of the driver improvement programs in most states, published research related to the effectiveness of such training is somewhat limited, especially in the past 10-15 years. Recent evaluative research on post-licensure driver training and education has focused almost exclusively on training for young drivers and older drivers.

However, a number of studies designed to examine the effectiveness of post-licensure training aimed at problem drivers were conducted in the 1970’s, 1980’s and 1990’s. These studies generally found driver re-education programs to be more effective at reducing violation recidivism and less effective at reducing future crashes ^(3,10,16,17). For

example, Struckman-Johnson et al. ⁽¹⁰⁾ reviewed twenty-six past studies and found significant variation in study results. In the studies they reviewed, average effectiveness ranged from crash reductions of 2.5 to 5.4 percent and violation differences ranging from an increase of 3.5 percent to a reduction of 9.2 percent depending on the nature of the re-education program. (See Table 3). As shown in Table 2, Matsen and Peck ⁽³⁾ found similar effect sizes with group meetings—a category that includes group education meetings and traffic violator schools, resulting in crash reductions of approximately 5 percent and violation reductions of approximately 8 percent.

Table 3. Mean effectiveness of driver re-education programs

Re-education program	Percent Change in Crashes	Percent Change in Violations
Group education meeting / Traffic violator school	-2.5	-9.2
Defensive driving / Accident avoidance school	-5.4	-5.4
Mailed pamphlet + self-exam	-5.0	3.5
Home instruction + violation reduction incentive	-5.3	-4.8

Source: Adapted from Struckman-Johnson et al. 1989

License Suspension/Revocation

Driver’s license suspension and revocation is another significant component of driver improvement programs across the United States. A review of license suspension policies in the United States conducted by Carnegie and Eger in 2008 found that “all fifty states and the District of Columbia use license suspension and/or revocation as a sanction to punish negligent drivers.” The review also found that “driver’s license suspension is now very commonly used as a means to punish individuals engaged in criminal and/or otherwise socially undesirable behavior unrelated to the operation of a motor vehicle. Suspension is also used as a means to compel compliance with administrative requirements such as appearing in court to answer a summons and payment of fines, fees and surcharges. Driver’s license suspension for non-driving reasons is also permitted in all fifty states and the District of Columbia.” ⁽⁶⁾

The results of studies aimed at assessing the effectiveness of license suspension have generally found that drivers suspended for poor driving behavior pose a comparatively higher safety risk than validly licensed drivers. However, drivers suspended for primarily non-driving reasons (e.g., failure to pay child support) pose only a slightly greater risk than the general driving population ^(18,19,20). Many studies have also found that license suspension is a very effective countermeasure used by licensing agencies to deter and correct negligent driver behavior, especially for Driving Under the Influence (DUI) offenses ^(21,22,23,24).

Matsen and Peck's ⁽³⁾ meta-analysis of past studies found that, on average, license suspension/revocation reduced subsequent crash rates by 17 percent and subsequent violations by more than 21 percent. They concluded that "license suspension or revocation is by far the most effective strategy." They further note that "...it is probably the threat of suspension that underlies the effects of some of the other interventions." ⁽³⁾

This review of national literature on negligent driver countermeasures and state practices with regard to driver improvement programs appears to indicate that New Jersey's program of driver improvement is in the mainstream of current practice. Further, the literature on countermeasure effectiveness over the past fifty years confirms that negligent driver interventions can be effective means of reducing violation and crash recidivism among many negligent driver subgroups. The effectiveness findings documented in the literature provide important context for an assessment of the driver improvement countermeasures currently used in New Jersey.

DRIVER MONITORING AND COUNTERMEASURES IN NEW JERSEY

Introduction

In New Jersey, the MVC uses a demerit point system to monitor driving behavior after licensure. The current point system has been in effect since 1 March 1977. As shown in Table 4, points are given to drivers for various moving violations. MVC utilizes a program of negligent driver countermeasures that become progressively more severe based on the accumulation of demerit points. The countermeasures vary based on the number and severity of violations and driver experience (e.g., teen vs. experienced drivers). The three primary countermeasures used in New Jersey include: point advisory notices, driver re-education classes, and license suspension. Secondary components include: negligent driver fees (MVC “insurance surcharges”) that are assessed concurrent with point advisory notices; point credits that accompany successful completion of MVC’s driver re-education classes; and a one-year probationary period that is imposed after completion of a driver re-education class and license suspension.

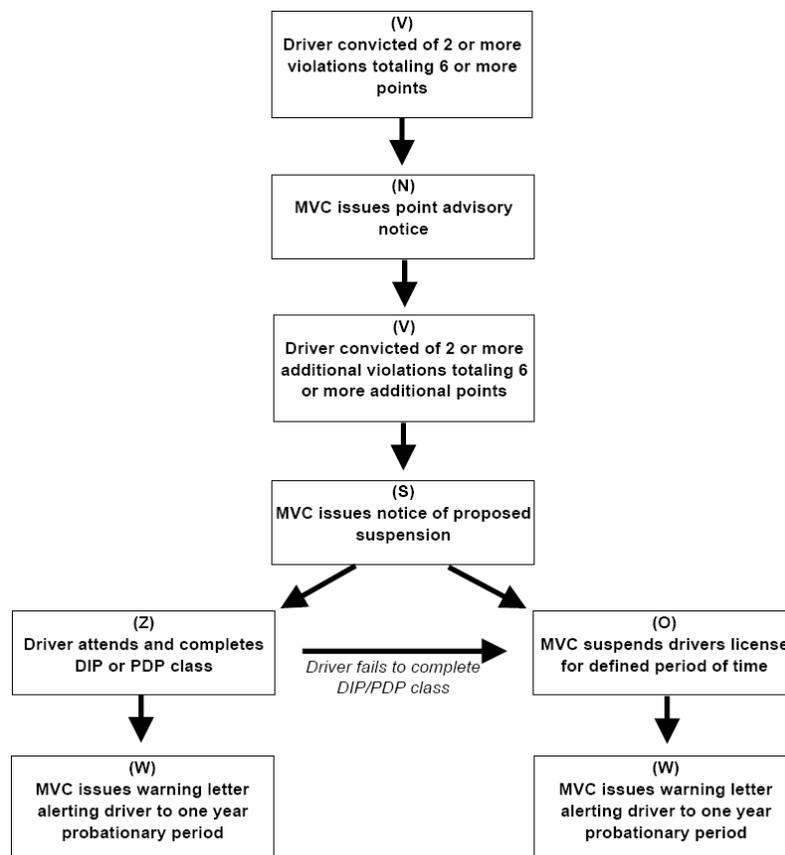


Figure 1. Basic sequence of driver violation and MVC administrative intervention

Table 4. New Jersey Point Schedule (abridged)

N.J.S.A. Chapter	Offense	Points
	<i>NJ Turnpike, Garden State Parkway and Atlantic City Expressway</i>	
27:23-29	Moving against traffic; Unlawful use of median strip	2
27:23-29	Improper passing	4
	<i>All roads and highways</i>	
39:3-20	Operating constructor vehicle in excess of 45 mph	3
39:4-14.3	Operating motorized bicycle on a restricted highway	2
39:4-14.3d	More than one person on a motorized bicycle	2
39:4-35	Failure to yield to pedestrian in crosswalk	2
39:4-36	Failure to yield to pedestrian in crosswalk; passing a vehicle yielding to pedestrian in crosswalk	2
39:4-41	Driving through safety zone	2
39:4-52 and 39:5C-1	Racing on highway	5
39:4-55	Improper action or omission on grades and curves	2
39:4-57	Failure to observe direction of officer	2
39:4-66	Failure to stop vehicle before crossing sidewalk	2
39:4-66.1	Failure to yield to pedestrians or vehicles while entering or leaving highway	2
39:4-66.2	Driving on public or private property to avoid a traffic sign or signal	2
39:4-71	Operating a motor vehicle on a sidewalk	2
39:4-80	Failure to obey direction of officer	2
39:4-81	Failure to observe traffic signals	2
39:4-82	Failure to keep right	2
39:4-82.1	Improper operating of vehicle on divided highway or divider	2
39:4-83	Failure to keep right at interchapter	2
39:4-84	Failure to pass to right of vehicle proceeding in opposite direction	5
39:4-85	Improper passing on right or off roadway	4
39:4-85.1	Wrong way on a one-way street	2
39:4-86	Improper passing in no passing zone	4
39:4-87	Failure to yield to overtaking vehicle	2
39:4-88	Failure to observe traffic lanes	2
39:4-89	Tailgating	5
39:4-90	Failure to yield at interchapter	2
39:4-90.1	Failure to use proper entrances to limited access highways	2
39:4-91-92	Failure to yield to emergency vehicles	2
39:4-96	Reckless driving	5
39:4-97	Careless driving	2
39:4-97a	Destruction of agricultural or recreational property	2
39:4-97.1	Slow speed blocking traffic	2
39:4-97.2	Driving in an unsafe manner (pts assessed for the third or subsequent violation(s) w/in 5 year period.)	4
39:4-98 and 39:4-99	Exceeding maximum speed 1-14 mph over limit	2
	Exceeding maximum speed 15-29 mph over limit	4
	Exceeding maximum speed 30 mph or more over limit	5
39:4-105	Failure to stop for traffic light	2
39:4-115	Improper turn at traffic light	3
39:4-119	Failure to stop at flashing red signal	2
39:4-122	Failure to stop for police whistle	2
39:4-123	Improper right or left turn	3
39:4-124	Improper turn from approved turning course	3
39:4-125	Improper U-turn	3
39:4-126	Failure to give proper signal	2
39:4-127	Improper backing or turning in street	2
39:4-127.1	Improper crossing of railroad grade crossing	2
39:4-127.2	Improper crossing of bridge	2
39:4-128	Improper crossing of railroad grade crossing by certain vehicles	2
39:4-128.1	Improper passing of school bus	5
39:4-128.4	Improper passing of frozen dessert truck	4
39:4-129	Leaving the scene of an accident - No personal injury	2
39:4-129	Leaving the scene of an accident - Personal injury	8
39:4-144	Failure to observe stop or yield signs	2
39:5D-4	Moving violation out of State	2

As shown in Figure 1, the basic sequence of driver violation and MVC intervention starts with negligent driver behavior followed by actions taken by MVC in response to that behavior. The sequence continues through a series of increasingly severe MVC interventions as the driver continues to accumulate violations.

Drivers in New Jersey may also request a suspension hearing before an administrative law judge. However, most drivers requesting a hearing are directed to first attend a pre-hearing conference with MVC driver control personnel before progressing to a hearing. The purpose of the pre-hearing conference is to explore alternatives to license suspension after a notice of scheduled suspension is ordered. Hearings before an administrative law judge are generally uncommon.

Finally, drivers participating in driver improvement classes and those that have their driving privileges restored following a suspension are placed on probation for one year. As part of the probation process, drivers receive a warning letter from MVC advising them of the probationary period and the consequences of committing another motor vehicle violation during probation. Specifically, any conviction for a point violation or an “unsafe operation” violation ⁽²⁵⁾, will result in the suspension of the driver’s license for a designated period of time.

According to MVC, 90 percent of New Jersey’s licensed drivers have zero negligent driver demerit points on their driving records. The remaining 10 percent have accumulated some level of points. Approximately 0.5 percent has six points, the threshold for MVC advisory action/notice. Less than 0.5 percent has twelve or more points, which places them at the level for MVC action in terms of suspension or mandatory attendance at a Driver Improvement Program (DIP) class.

The three primary driver improvement countermeasures used in New Jersey—point advisory notices, driver re-education classes and license suspension and accompanying secondary components, are described in more detail below.

Point Advisory Notices

The MVC issues two types of point advisory notices. The first type of notice is issued to experienced drivers when they have accumulated six or more demerit points ⁽²⁶⁾. The practice of issuing such notices was established in 1982 and the main intent of the notice is informational. The notice informs drivers of the number of points accumulated as of a specific date and provides information on the general nature and effect of the point system, including:

- The driver will receive a scheduled license suspension if she/he accumulates twelve or more points.

- All point violations committed after 1 March 1974 are included in the driver's overall point record.
- Point reductions are given at the rate of three points for each twelve consecutive months in which the driver has not committed a violation resulting in either the assessment of points or in the suspension of the driving license.

The second type of advisory notice is sent to probationary drivers if they are convicted of a motor vehicle violation requiring the assessment of points. This type of notice is not prescribed by statute but is described in New Jersey Administrative Code ⁽²⁷⁾. Similar to the experienced driver advisory notice the probationary advisory notice informs drivers of the number of points accumulated as of a specific date. The probationary notice also informs recipients they will be required to complete a Probationary Driver Program (PDP) re-education class if they are convicted of a second violation resulting in a total point accumulation of four or more points.

In addition, the MVC has in place a program of negligent driver fees known as "insurance surcharges." These fees are assessed against drivers accumulating six or more points and those that commit serious moving violations for which no demerit points accrue. Drivers are assessed \$150 for the first six points and \$25 for each additional point thereafter. The fees are levied each year for three years and are in addition to any court-imposed fines and/or penalties. While not an integrated component of the MVC's negligent driver countermeasure program, the fees associated with the insurance surcharge program are assessed concurrently with the issuance of point advisory notices. The fees most likely act as a deterrent to future violations for some drivers.

Driver Re-Education Classes

There are two driver re-education classes offered in New Jersey: The Driver Improvement Program (DIP) and Probationary Driver Program (PDP). The DIP was established in 1969 and the PDP was established in 1977. The DIP class is designed as a three-hour classroom session managed by the MVC. The target audience for the program is experienced drivers who have accumulated twelve or more demerit points under the MVC point system. There is a \$150 fee for participating in the class and there are fifteen sites located throughout New Jersey offering the classes.

Drivers who have accumulated twelve to fourteen points in a period greater than two years are offered the program as an alternative to license suspension. Other drivers may take the class in lieu of part or all of a proposed point suspension as a result of a pre-hearing suspension settlement conference, an administrative law judge's decision that is affirmed by the MVC, or a final MVC decision. Drivers who fail to attend the class as scheduled are suspended for the period specified in their original notice of scheduled suspension, settlement agreement or hearing decision.

The PDP class is a four-hour classroom program managed by the MVC for teen drivers who have accumulated four or more points and have committed two violations within a two year period after their first driver exam permit is issued. The fee for participating in the program is \$150. PDP classes are held at the same sites as the DIP classes. If the offender fails to complete the program, he/she is suspended indefinitely until the course is completed and license restoration fee is paid.

Drivers who have completed the DIP or PDP classes receive a point reduction credit of three points against any points on their driving record. These credits may only be received one time in any two year period. Drivers are also placed on a one-year probation and are warned they are subject to license suspension for any point-carrying motor vehicle violation committed within one year after completing the course or if convicted of the unsafe driver violation, with the precise suspension period dependent upon how soon the violation is committed following program completion and a driver's accumulated points.

As shown in Figure 2 and Figure 3, enrollment in the DIP and PDP classes has been declining since approximately 2000. DIP enrollment has dropped from a high of 4,336 in 1997 to 2,765 in 2008. This represents a decline of 36 percent. The decline in PDP enrollment is even more pronounced, dropping from 19,052 in 1997 to 6,650 in 2008, a 65 percent decline (see Table 5).

Table 5. DIP and PDP enrollment (1997-2008)

Year	PDP	DIP
1997	19,052	4,336
1998	13,227	3,027
1999	13,185	3,435
2000	12,801	3,045
2001	12,155	2,588
2002	11,629	2,174
2003	6,970	2,182
2004	4,676	2,009
2005	4,520	1,940
2006	6,767	2,398
2007	6,944	2,796
2008	6,650	2,765

Source: New Jersey Motor Vehicle Commission

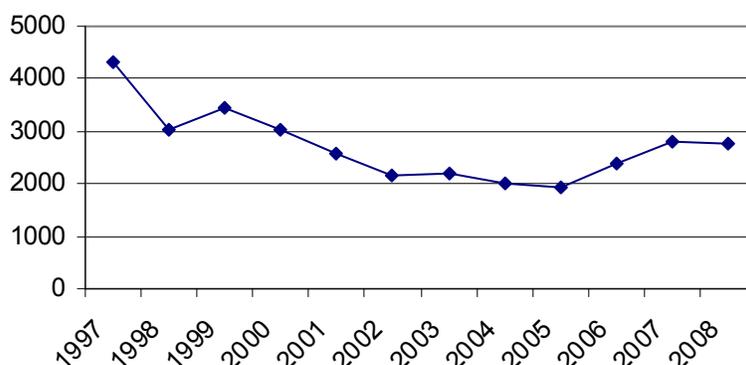


Figure 2. Driver Improvement Program (DIP) enrollment (1997-2008)

Source: New Jersey Motor Vehicle Commission

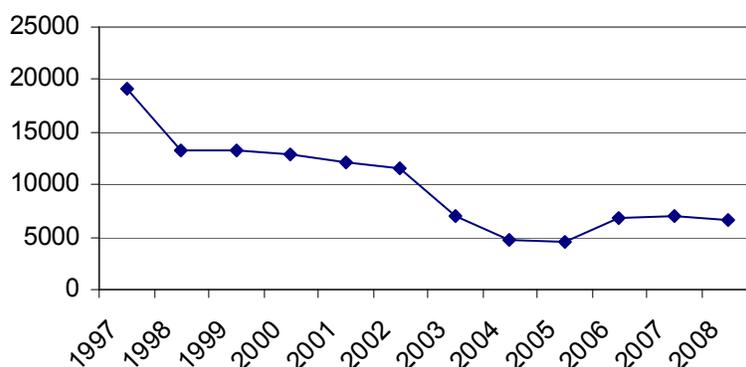


Figure 3. Probationary Driver Program (PDP) enrollment (1997-2008)

Source: New Jersey Motor Vehicle Commission

One reason for the decline in program participation is believed to be the passage of legislation that took effect in July 2000. The legislation, which was enacted to “clarify the duties and responsibilities” of municipal prosecutors in accepting plea agreements related to motor vehicle offenses, created a new zero-point traffic violation frequently used to plea bargain point-carrying moving violations. The new law made it unlawful to operate a motor vehicle in a “...unsafe manner likely to endanger a person or property.” The “unsafe operation” violation carries zero negligent driver demerit points for the first and second offenses ⁽²⁵⁾. In September 2008, New Jersey Attorney General Anne Milgram issued a directive instructing municipal prosecutors that they are “no longer permitted to enter into plea agreements that result in zero penalty points for graduated driver licensees.” ⁽²⁸⁾

In New Jersey, drivers can take a voluntary DDP class. All DDP classes must provide at least six hours of instruction and drivers who complete a voluntary DDP class approved by MVC receive a point reduction credit of two points against any points on their driving record. DDP credit is given for completing the class only one time in any five year period. Drivers completing the course also qualify for an auto insurance rate reduction "... available to the insured for a three-year period beginning with the next succeeding policy period after the date of completion of an approved motor vehicle defensive driving course or until driver's license suspension or the accumulation of four or more motor vehicle points, whichever occurs earlier ⁽²⁹⁾.

As of July 2009, there were twenty-three state-approved in-classroom DDP courses available and fourteen online DDP courses. DDP courses first became available online beginning in 2007. MVC determines approval for DDP courses by assessing if they meet/exceed standards of the National Safety Council's defensive driving course and if their program has been determined to be effective in terms of either reducing moving violation convictions or accident involvement or both ⁽³⁰⁾. Although approved by MVC, DDP courses are not a negligent driver countermeasure administered by the MVC and therefore were not included in the analysis of countermeasure effectiveness presented in the next chapter.

Drivers License Suspension

In New Jersey, driver's license suspensions are imposed for both driving and "non-driving" reasons. Table 6 presents the average number of suspensions ordered or confirmed by MVC each year for the top twelve "reasons" for suspension. Overall, the two categories of suspensions with the highest annual volume are failure to pay MVC insurance surcharges, followed by failure to appear in court to answer/pay parking tickets.

Given the nature of this study, the categories of most interest are suspensions associated with the accumulation of negligent driver demerit points and for serious moving violations. As shown in Table 6, in 2004, approximately 22,000 license suspensions were ordered annually for accumulation of points. This number was steady from 2000-2004. Another 6,000 were ordered for serious moving violations. It is noteworthy that suspensions for accumulation of points and serious moving violations (excluding DUI) account for less than 5 percent of all license suspensions order annually by MVC ⁽³¹⁾.

Table 7 provides data from a 2007 study conducted by Carnegie for the MVC. According to the study, in May 2004 when data was exported from the MVC driver history database, approximately 17,000 drivers had their license suspended for accumulation of points and/or serious moving violations. Of those drivers, the vast majority (89 percent) were male drivers. In May 2004, less than 0.5 percent of all

licensed drivers in the state had active license suspensions for point accumulation or serious moving violations ⁽³¹⁾.

Table 6 –Top twelve “reasons” for license suspension in New Jersey (2004)

Reason for suspension	Number of suspension orders (2004)	Percent of total
1. Failure to pay MVC insurance surcharge	228,000	28%
2. Failure to appear in court to satisfy a parking summons (Parking Offenses Adjudication Act)	140,000	17%
3. Failure to appear in court to satisfy a summons (moving violations, municipal ordinances)	121,000	15%
4. Failure to comply with a court ordered installment plan or to satisfy other requirements of a court sentence (rehabilitation program, community service, court surcharges or assessments)	70,000	8%
5. Driving while suspended	47,000	6%
6. Failure to comply with a child support order	25,000	3%
7. Operating a vehicle under the influence of alcohol or drugs	25,000	3%
8. Uninsured motorist – Insurance cancelled or court ordered suspension for driving an uninsured motor vehicle	25,000	3%
9. Accumulation of points from moving violations/persistent violator	22,000	3%
10. Drug related offenses under the Comprehensive Drug Reform Act	20,500	2%
11. Failure to make good on dishonored checks submitted to courts and/or MVC for fees	9,000	1%
12. Serious moving violations (reckless driving, leaving the scene of accident, high speed)	6,000	1%

Source: Carnegie (2007). Original Source: New Jersey Motor Vehicle Commission

Table 7 – Gender distribution of drivers suspended for point accumulation and serious driving offenses (2004)

	Male	Female	Total
Number of licensed drivers in NJ	2,871,602	2,962,898	5,834,500
Number of suspended drivers ¹	15,312	1,908	17,220
Percent of total suspended drivers	89%	11%	100%
Suspension Rate ²	0.5%	0.1%	0.3%

Sources: Adapted from Carnegie (2007). Original Sources: USDOT, Federal Highway Administration, Office of Highway Policy Information; New Jersey Motor Vehicle Commission

Notes: 1 – Based on data exported from MVC driver history database in May 2004. This number represents a “snapshot” in time. The number of drivers suspended on any given day will vary. Suspended drivers include currently suspended drivers who have had their driving privileges withdrawn at least one time for the stated reason. Includes point accumulation (PTPA+ PTPB+ PTPC+ PTPD), reckless driving (0496), failure to complete probationary driver program (FCPD) & persistent violator (PVPS); 2 - Ratio of suspended drivers to licensed drivers.

Point-related license suspension in New Jersey is classified by MVC into one of three levels—A, B or C ⁽³²⁾. Level A suspensions are ordered for drivers who accumulate twelve or more points within a period of two years or less. Level B suspensions are ordered for drivers who have accumulated 15 or more points within a greater than two-year period. Finally, Level C suspensions are ordered for drivers who accumulate 12 to 14 points within a greater than two year period. DIP participation is an option for Level C violators. Level A and/or Level B violators can only participate in the DIP if deemed appropriate as a result of a MVC pre-hearing suspension settlement conference, an administrative law judge's decision that is affirmed by the MVC, or other final MVC administrative decision. Typical suspension periods range from 30 days for those with 12-13 points and 60 days for those with 14-15 points. Suspension periods for serious moving violations range from 30 days up to 10 years or longer for some DUI convictions. Drivers are placed on one-year probation after completing their suspension period and warned that subsequent violations will result in an additional period of suspension.

A study recently completed for MVC found that from 1999 to 2006, the number of drivers subjected to MVC negligent driver countermeasures fell from approximately 142,300 in 1999 to approximately 91,300 in 2006, the last year for which complete data was available ⁽³⁸⁾. (See Table 8). This represents a 36 percent decline in the number of negligent drivers sanctioned by MVC.

Table 8 – Number of MVC sanctions ordered annually (1997-2008)

Year	Point Notice + Fee	Driver Re-education Class	Point Suspension	Total
1997	105,874	23,388	n/a	--
1998	98,226	16,254	n/a	--
1999	99,916	16,620	25,781	142,317
2000	91,546	15,846	22,789	130,181
2001	88,190	14,743	23,017	125,950
2002	72,348	13,803	23,004	109,155
2003	59,817	9,152	21,713	90,682
2004	64,283	6,685	22,185	93,153
2005	59,598	6,460	18,125	84,183
2006	64,284	9,165	17,882	91,331
2007	n/a	9,740	18,289	--
2008	n/a	9,415	18,821	--

Source: Carnegie (2009)

ANALYSIS OF COUNTERMEASURE EFFECTIVENESS IN NEW JERSEY

The analysis of countermeasure effectiveness included two primary areas of inquiry. Phase one analysis sought to document violation and crash recidivism among and between driver subgroups. Phase two examined how effective various driver improvement countermeasures are at reducing future violations and crashes among problem drivers in New Jersey. Phase two also compared effectiveness of the three primary countermeasures relative to one another. Data acquisition and analysis methods and the results of the analyses are presented below.

Data Acquisition and Preparation

Driver history data in New Jersey is maintained by the MVC in cooperation with the NJ Office of Information Technology using a mainframe legacy database system (Oracle). The MVC utilizes “event codes” to record violations, suspensions and other MVC and court actions on driver history records. There are a total of 1,795 individual event codes. Of these, 332 are used to denote violations events. Of the latter, there are 100 codes for point-carrying violations, and 232 codes for non-point violations including equipment and document violations among others.

The process for retrieving data involves a multi-staged request and varying levels of programming depending on the complexity of the data requested. In December 2006 the research team submitted a final request for data in order to complete this study. Specifically, basic driver information and driver history data for all drivers having at least one “event” of any type entered on their driver history between 1 January 1986 and 31 December 2006 was requested. Events included violations and point credits, license suspensions, other administrative interventions/driver rehabilitation events, information/memo events, fee payments, and accidents. Data was requested for the most recent 100 events posted on each driver’s record for those drivers with at least one event posted on their record after 1 January 1986. Drivers that had no events dated 1 January 1986 or after were excluded from the data export.

In May 2007, the MVC provided the research team with a dataset delivered in eleven separate space-delimited text files ranging in size from approximately 175,000 to 1 million records per file. Each record included approximately 4,800 data fields. In total, the data included approximately 8.8 million unique driver records for drivers that had at least one event (of any type) recorded on their driver history between 1 January 1986 and 31 March 2007. The text files were imported into SAS 9.1 for data analysis.

A review of the database revealed that approximately 25 percent of the drivers included in the data export had long expired drivers licenses. The database was filtered to exclude drivers with licenses that expired prior to 1 January 1997. This filtering resulted in the exclusion of approximately 2.3 million driver records, effectively reducing the size of the database to 6.4 million drivers. It should also be noted that the database included

some drivers that were no longer validly licensed for one reason or another. Some possible reasons include: failure to notify MVC after moving out of state, failure to renew an expired license and failure to notify MVC after the driver is deceased. These records were retained and included in the analysis. According to MVC, New Jersey has approximately 5.9 million validly licensed drivers at any given time.

As shown in Table 9, there were more than 95 million unique events recorded in the database – approximately 50 million occurring prior to 1997 or having missing or invalid event dates and approximately 45 million events occurring since 1 January 1997. For the purpose of our analysis, we focused on events that occurred after 1 January 1997, but included earlier events as needed to support analysis of individual driver histories. Events with missing or invalid event dates were not included in the dataset used to perform the analyses.

Table 9. Year of recorded event

Events	Frequency
Prior to Jan 1, 1997 or event date missing/invalid	50,477,639
After Jan 1, 1997	44,754,579
Total	95,232,218

Approximately 30 percent of the unique events occurring since 1 January 1997 were violation-related. Another 33.5 percent were suspension-related events and approximately 4.5 percent were crash events (accidents). The remaining 36.6 percent of the events are various other types, including informational/memo, fee payment, etc. (See Table 10).

Table 10. Distribution of events by type (Jan 1, 1997 to Mar 31, 2007)

Event Type	Frequency	Percent
Violation (U,V,Z)	13,414,769	30.0
Suspension (G,L,O,R,S)	14,971,377	33.5
Info (B,M,N,W)	9,716,847	21.7
Accident (A)	1,995,304	4.5
Rehab (C,E,I,K,P)	335,058	0.7
Fee (D,F)	4,321,204	9.7
Total	44,754,559	100

Phase One – Analysis of Overall Violation and Crash Recidivism in New Jersey

As stated earlier in the report, one of the primary objectives of this study was to assess the effectiveness of driver improvement countermeasures currently used by MVC to address problem drivers. Phase one analysis utilized MVC driver history data to examine aggregate violation and crash patterns by gender and age. This analysis provides a base-line understanding of driver behavior among the population of drivers with a violation history. Table 11 provides the age group breakdowns used in the Phase 1 analysis and the distribution of licensed drivers in New Jersey by age group. It should be noted that in some cases, the categories Mature1 and Mature2 were combined for statistical reporting purposes.

Table 11 – Estimated number of licensed drivers in NJ by age category (2006)

Age Category	Male	Female	Total	Percent of total
Teen (16-17)	33,492	32,597	66,089	1%
Young (18-24)	317,498	315,065	632,563	11%
Experienced1 (25-34)	455,903	475,296	931,199	16%
Experienced2 (35-44)	592,600	613,451	1,206,051	21%
Experienced3 (45-54)	599,100	611,875	1,210,975	21%
Mature (55-84)	828,476	867,465	1,695,941	29%
Old (85 and more)	44,533	47,149	91,682	2%
Total	2,871,602	2,962,898	5,834,500	100%

Source: USDOT, Federal Highway Administration, Office of Highway Policy Information, October 2007

Table 12 shows the prevalence of violation events by gender and age group at the time the event occurred. The analysis included events occurring between 1 January 1997 and 31 March 2007. As shown in Table 12, 53 percent of all the violation events occurring during this period were recorded against drivers when they were age 18-34. Approximately 4 percent of violations were recorded against teen drivers during their first year of driving. Teen and young drivers have the highest estimated annual rates of violation, while experienced and mature drivers ages 35 to 84 have the lowest rates.

In terms of crash involvement, Table 13 shows the distribution of crash events by gender and age. There were almost two million unique crash events recorded in the MVC driver history data. Experienced drivers ages 25-34 and experienced drivers ages 35 to 44 had the greatest incidence of crash involvement. These groups accounted for 43 percent of all crashes occurring during the period 1 January 1997 to 31 March 2007. Once again, teen and young drivers have the highest estimated annual crash rates per licensed driver, while experienced and mature drivers ages 35 to 84 have the lowest rates.

Table 12. Distribution of violation events by gender and age group at the time of event (Jan 1, 1997 to Mar 31, 2007)

Number of violations (Event Type "V")	Male	Female	Total	Percent of total	Estimated annual violation rate per licensed driver
Teen (16-17)	209,300	77,658	286,958	4%	0.42
Young (18-24)	1,520,197	609,387	2,129,584	27%	0.33
Experienced1 (25-34)	1,431,987	611,967	2,043,954	26%	0.21
Experienced2 (35-44)	1,119,736	554,763	1,674,499	21%	0.14
Experienced3 (45-54)	678,311	343,354	1,021,665	13%	0.08
Mature (55-84)	306,956	138,803	445,759	6%	0.03
Old (85 and more)	145,431	66,680	212,111	3%	0.23
Total	5,418,300	2,405,926	7,824,226	100%	0.13

Notes: Drivers with invalid or missing data in the date of birth fields were not included in the analysis and are not reported in the table. Estimated annual violation rates per licensed driver were calculated by dividing total violations by 10.25 (the number of years for which data is available) and then dividing by the number of licensed drivers in each age category. This calculation assumes that the total number of violations per year remains generally constant and that the distribution of drivers in each age category remains generally constant from year to year.

Table 13. Distribution of crash events by gender and age group at the time of the event (Jan 1, 1997 to Mar 31, 2007)

Crashes (Event Code "A")	Male	Female	Total	Percent of total	Estimated annual crash rate per licensed driver
Teen (16-17)	42,560	36,501	79,061	4%	0.12
Young (18-24)	213,077	164,096	377,173	19%	0.06
Experienced1 (25-34)	230,813	173,050	403,863	20%	0.04
Experienced2 (35-44)	243,591	185,066	428,657	22%	0.03
Experienced3 (45-54)	191,575	140,279	331,854	17%	0.03
Mature (55-84)	208,100	143,866	351,966	18%	0.02
Old (85 and more)	7,249	4,896	12,145	1%	0.01
Total	1,136,965	847,754	1,984,719	100%	0.03

Note: Data reporting issues related to crashes occurring prior to 2000 resulted in a systematic under reporting of crash events on driver history records in the years prior. Although the total number of crash events appearing in the database is most likely underreported, there is no evidence to indicate that the distribution of crash events among and between driver subgroups is biased. Drivers with invalid or missing data in the date of birth fields were not included in the analysis and are not reported in the table. Estimated annual crash rates per licensed driver were calculated by dividing total crashes by 10.25 (the number of years for which data is available) and then dividing by the number of licensed drivers in each age category. This calculation assumes that the total number of crashes per year remains generally constant and that the distribution of drivers in each age category remains generally constant from year to year.

As shown in Table 14, **violation recidivism** (two or more violation events), as a percent of total drivers in each group is highest among young drivers (ages 18-24). 60 percent of male drivers and 44 percent of female drivers in this age group had more than one

violation recorded in their driving history during the period that they were between the ages of 18 and 24. Recidivism rates are lowest among drivers 85 years and older. Also noteworthy is the fact that 32 percent of teen male drivers and 19 percent of teen female drivers received more than one violation in their first one to two years of driving. It is important to note however that the number of years of exposure in each age category differs. If the violation rates are normalized to adjust for this variation in exposure years, the group of drivers with the highest rate of recidivism is teen male drivers. Teen male drivers have rates of recidivism 800 percent to 2,100 percent higher than other driver subgroups.

Table 14 – Rates of violation recidivism by gender and age group at the time of the events (Jan 1, 1997 to Mar 31, 2007)

Gender/Age Category	One event	More than one event	Total	Recidivism percent	Exposure years	Recidivism rate per year of exposure
Male						
Teen (16-17)	93,516	44,878	138,394	32%	1.5	0.22
Young (18-24)	223,979	329,967	553,946	60%	7	0.09
Experienced1 (25-34)	312,083	326,751	638,834	51%	10	0.05
Experienced2 (35-44)	308,873	255,631	564,504	45%	10	0.05
Experienced3 (45-54)	230,915	150,766	381,681	40%	10	0.04
Mature (55-84)	204,652	91,002	295,654	31%	30	0.01
Female						
Teen (16-17)	50,325	11,908	62,233	19%	2	0.10
Young (18-24)	177,816	141,067	318,883	44%	7	0.06
Experienced1 (25-34)	228,006	134,509	362,515	37%	10	0.04
Experienced2 (35-44)	235,635	116,827	352,462	33%	10	0.03
Experienced3 (45-54)	169,583	66,847	236,430	28%	10	0.03
Mature (55-84)	127,547	32,206	159,753	20%	30	0.01
Old (85 and more)	2,558	336	2,894	12%	10	0.01

Notes: 1) Drivers with invalid or missing data in the date of birth fields were not included in the analysis and are not reported in the table. 2) Driver counts by gender cannot be summed due to the fact that drivers may appear in multiple age categories during the analysis period.

Rates of **crash recidivism** (two or more accident events) as a percent of total drivers in each group ranged from a low of 9 percent among teen (age 16-17) female drivers to a high of 25 percent among young (age 18-24) male drivers. (See Table 15). Once again, it is important to note that the number of years of exposure in each age category differs. If the crash rates are normalized to adjust for this variation in exposure years, the group of drivers with the highest rate of crash recidivism is teen male drivers. Teen male drivers have rates of crash recidivism 40 percent to 600 percent greater than other subgroups.

Table 15 – Rates of crash recidivism by gender and age group at the time of the events (Jan 1, 1997 to Mar 31, 2007)

Gender/Age Category	One event	More than one event	Total	Recidivism percent	Exposure years	Recidivism rate per year of exposure
Male						
Teen (16-17)	33,970	4,087	38,057	11%	1.5	0.07
Young (18-24)	119,325	39,907	159,232	25%	7	0.04
Experienced1 (25-34)	138,130	39,217	177,347	22%	10	0.02
Experienced2 (35-44)	152,348	38,888	191,236	20%	10	0.02
Experienced3 (45-54)	124,335	28,818	153,153	19%	10	0.02
Mature (55-84)	138,673	30,063	168,736	18%	30	0.01
Female						
Teen (16-17)	29,956	3,130	34,043	9%	2	0.05
Young (18-24)	101,564	27,560	141,471	19%	7	0.03
Experienced1 (25-34)	118,216	24,519	157,433	16%	10	0.02
Experienced2 (35-44)	131,815	24,025	170,703	14%	10	0.01
Experienced3 (45-54)	103,406	16,728	132,224	13%	10	0.01
Mature (55-84)	108,092	16,363	138,155	12%	30	0.00
Old (85 and more)	3,730	524	4,687	11%	10	0.01

Notes: 1) Data reporting issues related to crashes occurring prior to 2000 resulted in a systematic under reporting of crash events on driver history records in the years prior. Although the total number of crash events appearing in the database is most likely underreported, there is no evidence to indicate that the distribution of crash events among and between driver subgroups is biased. 2) Drivers with invalid or missing data in the date of birth fields were not included in the analysis and are not reported in the table. 3) Driver counts by gender cannot be summed due to the fact that drivers may appear in multiple age categories during the analysis period.

Phase Two: Analysis of Countermeasure Effectiveness in New Jersey

Phase two of the analysis sought to examine the effectiveness of various negligent driver countermeasures. To do this, the research team conducted a longitudinal analysis of driver history records using a sample of drivers in three primary analysis subgroups. The analysis subgroups included: 1) drivers that received point advisory notices; 2) drivers that completed either the driver improvement program or probationary driver program re-education class; and, 3) drivers that had their license suspended. Each subgroup was stratified by age and gender for the purpose of analysis. Two measures of effectiveness were considered: effect on violation recidivism and effect on crash involvement. The following subchapters describe the methods used for the analyses and the results.

Analysis Methods

The phase two analysis examined drivers subjected to countermeasures between 1 January 2002 and 31 December 2004. The first step undertaken to prepare the data for analysis was to select out those drivers subjected to countermeasures during this period. After selecting only those drivers, the phase two database was then parsed into

groups based on the countermeasure imposed. Although the analysis is reported below according to “major” intervention category (i.e., point advisory notice, driver re-education class, and license suspension) for the purpose of sampling and analysis, sub-groupings within each category were retained. The coding scheme used to group drivers by countermeasure appears in Table 16. The Phase 2 database was then stratified by age and gender. The number of observations fitting this sample frame is presented in Table 17.

Table 16. Data coding scheme for phase two data sample

Group #	MVC Event Type Code	MVC Event Responsibility Code	MVC Event ID Code	Administrative intervention
1	N	DIP	PTPS	Point Advisory Letter (DIP)
2	N	PDP	PTPD	Point Advisory Letter (PDP)
3	S	SUS	PTPA PTC2	Scheduled Suspension Notice (Level A / No class)
4	S	SUS	PTPB	Scheduled Suspension Notice (w/o DIP option)
5	S	SUS	PTPC	Scheduled Suspension Notice (w/ DIP option)
6	S	SUS	PVPS	Scheduled Suspension Notice (Persistent Violator)
7	S	PDP	PTPD VVPD	Scheduled Suspension Notice (PDP / PDP persistent violator)
8	Z	DIP	PC03	Driver Improvement Program (DIP)
9	Z	PDP	PC03 PC02 PC01	Probationary Driver Program (PDP)
10	O	SUS	PTPA PTC2	License Suspension (Level A / No Class)
11	O	SUS	PTPB	License Suspension (Level B)
12	O	SUS	PTPC	License Suspension (Level C)
13	O	SUS	PVPS	License Suspension (Persistent Violator)
14	O	PDP	PTPD VVPD	License Suspension (PDP / PDP persistent violator)
15	W	DIP	0001 0002 0003 0004	Warning Notice
16	W	PDP	0001 0002	Warning Notice

Table 17. Phase two database structure

Group #	Teen (16-17 years old)			Young (18-24 years old)			Older (25 years +)			All Drivers		
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
1	0	0	0	13,884	58,997	72,881	24,504	95,756	120,260	38,388	154,753	193,141
2	23,411	57,681	81,092	0	0	0	0	0	0	23,411	57,681	81,092
3	0	0	0	1,116	7,634	8,750	1,081	6,252	7,333	2,197	13,886	16,083
4	0	0	0	363	4,262	4,625	2,372	23,823	26,195	2,735	28,085	30,820
5	0	0	0	706	5,228	5,934	2,154	13,240	15,394	2,860	18,468	21,328
6	0	0	0	653	6,583	7,236	2,313	19,195	21,508	2,966	25,778	28,744
7	3,157	21,976	25,133	0	0	0	0	0	0	3,157	21,976	25,133
8			0	279	1,967	2,246	1,145	8,175	9,320	1,424	10,142	11,566
9	6,568	27,696	34,264	0	0	0	0	0	0	6,568	27,696	34,264
10	0	0	0	1,039	7,105	8,144	960	5,636	6,596	1,999	12,741	14,740
11	0	0	0	314	3,879	4,193	2,103	20,493	22,596	2,417	24,372	26,789
12	0	0	0	430	3,318	3,748	1,370	8,231	9,601	1,800	11,549	13,349
13	0	0	0	589	6,010	6,599	2,220	18,178	20,398	2,809	24,188	26,997
14	3,017	21,034	24,051	0	0	0	0	0	0	3,017	21,034	24,051
15	0	0	0	325	2,236	2,561	1,322	9,827	11,149	1,647	12,063	13,710
16	6,678	28,126	34,804	0	0	0	0	0	0	6,678	28,126	34,804
Total	42,831	156,513	199,344	19,698	107,219	126,917	41,544	228,806	270,350	104,073	492,538	596,611

Note: This table presents the number of observations by intervention group, gender, and age in phase 2 database.

The phase two database was then sampled again to achieve a targeted sample size per cell of approximately 2,000. If a cell contained less than or slightly more than 2,000 observations, the full data was retained. If a cell contained significantly more than 2,000 observations, a random sample of approximately 2,000 was generated from the observations in that cell. This sampling process resulted in a final sample frame of approximately 130,000 observations, including 45,000 female drivers and 84,000 male drivers.

The phase two analysis was based on the underlying hypothesis that various countermeasures used in New Jersey are an effective means of correcting negligent driver behavior. As such, it was expected that each countermeasure would reduce violation rates and crash involvement after the countermeasure was imposed. A number of statistical investigations were used to test this hypothesis. The investigations included:

- Analysis of violation rate differences: This analysis was conducted by calculating the mean rate of violation among drivers in each subgroup in the two-year period after intervention and comparing that rate to the mean rate of violation among the same drivers in the two-year period before the intervention was imposed.
- Analysis of violation time lag: This analysis was conducted by calculating the mean number of days (time lag) between when an intervention was imposed against drivers in each subgroup and when drivers in each subgroup committed their first violation after the intervention was imposed.
- Analysis of crash rate differences: This analysis was conducted by calculating the mean rate of crash involvement among drivers in each subgroup in the two-year period after intervention and comparing that rate to the mean rate of crash involvement among the same drivers in the two-year period before the intervention was imposed.
- Analysis of crash involvement time lag: This analysis was conducted by calculating the mean number of days (time lag) between when an intervention was imposed against drivers in each subgroup and when drivers in each subgroup are involved in their first crash after the intervention was imposed.

In addition, the analysis involved a series of tests of significance to determine whether the effect of various countermeasures was different depending on the age and gender of the driver. Analysis results are reported below for the three primary countermeasures used in New Jersey.

Point Advisory Notice + Negligent Driver Fee

As described earlier, the first countermeasure used in New Jersey to address negligent driver behavior is a point advisory notice accompanied. Point advisory notices issued to experienced drivers are accompanied by negligent driver fees (MVC “insurance surcharges”). Point advisory notices issued to probationary drivers are not accompanied by fees unless the driver accumulates six or more points. This is generally the least severe of the three primary countermeasures used by MVC. Analysis results indicate that point advisory notices accompanied by negligent driver fees (referred to as “point notices + fees”) are an effective means of reducing violation recidivism and crash involvement for most negligent driver subgroups for at least some period of time after the intervention is imposed. As explained in more detail below, the one notable exception appears to be teen male drivers.

Post-intervention violation recidivism

A comparison of violation rates in the two-year period before and after drivers receive a point notice + fee reveals that violation rates among drivers in all driver subgroups except male teen drivers decrease substantially in the two-year period following intervention. The analysis indicates that point notices + fees are most effective for female drivers with both young and older female drivers demonstrating the greatest rate reductions. Point notices appear to be least effective for teen drivers of both genders with the rate of violation actually increasing for male teen drivers in the two-year period after intervention. (See Table 18).

Table 18. Comparison of mean violation rates before and after point notice + fee

Driver Subgroup	Gender	Sample Size	Mean Rate Before	Mean Rate After	Mean Rate Change	Percent Rate Change	t-value	p-value
Young Drivers	F	3,288	3.30	1.28	-2.03	-62%	-54.0	< 0.0001
			(1.75)	(1.54)	(2.15)			
	M	3,654	3.67	1.72	-1.94	-53%	-44.24	< 0.0001
			(1.99)	(1.99)	(1.99)			
Older Drivers	F	3,000	2.58	0.90	-1.68	-65%	-52.71	< 0.0001
			(1.39)	(1.30)	(1.75)			
	M	3,386	2.84	1.18	-1.65	-58%	-45.16	< 0.0001
			(1.72)	(1.51)	(2.13)			
Teen Drivers	F	2,007	1.32	0.94	-0.38	-29%	-12.06	< 0.0001
			(0.71)	(1.32)	(1.42)			
	M	2,014	1.53	1.71	0.18	12%	3.89	0.9999
			(0.94)	(1.95)	(2.09)			

Notes: All t-tests are one-sided t-test, with the null hypothesis being: rate difference is ≥ 0 and the alternative hypothesis being: rate difference is < 0 . That is there is a reduction in the rate of violation. The numbers appearing in parentheses below the mean rate statistics for each subgroup are the standard deviation corresponding to the number above.

Part of this observed difference could be due to the fact that the “trigger” for point advisory notices issued to teen drivers is the accumulation of four points. Consequently, teen drivers receiving a point advisory notice are not concurrently assessed negligent driver fees. These fees most likely result in additional behavioral affects.

In all cases, except teen male drivers the rate differences were statistically significant. It is important to note however that there appears to be significant variation between the rates of violation both before and after intervention in each driver subgroup. This is evidenced by the high standard deviation statistics provided in parentheses below the mean rate statistics in the table.

The mean time lag between when drivers received a point notice + fee and when they committed their next violation was approximately 295 days for young and older drivers and 290 days for teen drivers. This difference was not statistically significant. It should be noted that there was significant variation in the mean time lag observed in the data for each subgroup.

Post-Intervention Crash Involvement

A comparison of crash involvement rates in the two-year period before and after drivers receive a point notice + fee from MVC reveals a somewhat similar pattern but there are noteworthy differences. For example, crash involvement rates among young and older drivers of both genders decrease in the two-year period following intervention but the rate of reduction is significantly less than that observed for post-intervention violation rates.

Table 19. Comparison of mean crash rates before and after point notice + fee

Driver Subgroup	Gender	Sample Size	Mean Rate Before	Mean Rate After	Mean Rate Change	Percent Rate Change	t-value	p-value
Young Drivers	F	3,288	0.41 (0.40)	0.29 (0.29)	-0.12 (0.10)	-29%	-7.641	< 0.0001
	M	3,654	0.4 (0.70)	0.29 (0.60)	-0.1 (0.90)	-25%	-6.991	< 0.0001
Older Drivers	F	3,000	0.27 (0.59)	0.23 (0.52)	-0.04 (0.76)	-15%	-2.933	0.0017
	M	3,386	0.29 (0.64)	0.27 (0.61)	-0.02 (0.82)	-7%	-1.355	0.0877
Teen Drivers	F	2,007	0.25 (0.64)	0.32 (0.61)	0.07 (0.82)	28%	3.888	0.9999
	M	2,014	0.22 (0.48)	0.36 (0.67)	0.15 (0.79)	68%	8.231	1.0

Notes: All t-tests are one-sided t-test, with the null hypothesis being: rate difference is ≥ 0 and the alternative hypothesis being: rate difference is < 0 . That is there is a reduction in the rate of violation. The numbers appearing in

parentheses below the mean rate statistics for each subgroup are the standard deviation corresponding to the number above.

Also noteworthy is that point notices appear to be of limited effectiveness among teen drivers of either gender. In both subgroups post-intervention crash rates are observed to be higher in the period after intervention. (See Table 19).

Again, part of this observed difference could be due to the fact that no concurrent negligent driver fees are assessed. Part of the difference may also be the result of greater exposure risk. By definition, most of the teen drivers in the sample population would have been driving for less than two years prior to the intervention; so their exposure risk will be less than the two-year period after intervention. In addition, it is important to note that the crash rates within each subgroup were highly variable (see standard deviation statistics in Table 19) and the rate differences for teen drivers of both genders were not statistically significant. These results make drawing conclusions about the effectiveness of point advisory notices in terms of reducing subsequent crash rates difficult for these subgroups.

Analysis results indicate that point notices + fees are most effective at reducing subsequent crash rates for young drivers of both genders. The rate reductions observed for both subgroups were statistically significant. In the case of older drivers, the results are mixed. Point advisory notices appear to be an effective means to reduce future crashes among older female drivers but the results are ambiguous for older male drivers.

When considering crash involvement it is important to remember that crashes are a relatively infrequent occurrence. Many drivers remain crash-free throughout their driving lives. Therefore the overall incidence of crashes within the sample population and within the analysis window of two years after intervention is very low.

In order to calculate mean time lag between when drivers received a point advisory notice and when they were involved in their first crash after the intervention it was necessary to eliminate the observations associated with drivers not involved in a crash in the two-year analysis window. The calculated time lag for drivers involved in a crash within the two-year period after intervention was approximately 328 days for young and older drivers and 342 days for teen drivers. This difference was not statistically significant. Once again, there was significant variation in the mean time lag observed in the data for each subgroup.

Driver Re-Education Class + Point Credit + One Year Probation

The second primary countermeasure used in New Jersey to address negligent driver behavior is participation in a driver improvement re-education class, which is accompanied by a point credit and one year probation (referred to as re-education class

only). Analysis results indicate that the driver improvement classes used in New Jersey appear to be an effective means of reducing violation recidivism for all negligent driver subgroups for at least some period of time after the intervention is imposed. The analysis related to crash recidivism was less conclusive. These results are explained in more detail below. In addition, when interpreting the results, it should be noted that during the course of the study the curriculum for the PDP class was substantially revised. The driver history data used for this study predates the curriculum revisions and therefore reflects the effectiveness of the earlier course curriculum.

Post-intervention violation recidivism

A comparison of violation rates in the two-year period before and after drivers successfully complete either the DIP or PDP driver re-education class reveals that violation rates among drivers in all driver subgroups decrease substantially in the two-year period following intervention. As shown in Table 20, driver re-education classes appear to be most effective for young female drivers, about equally effective for young male, teen female and older drivers of both genders and least effective for teen male drivers which have the lowest rate of observed change.

For all driver subgroups, the rate differences were statistically significant. Again, there was significant variation between the rates of violation both before and after intervention in each driver subgroup. This is evidenced by the high standard deviation statistics provided in parentheses below the mean rate statistics in the table.

Table 20. Comparison of mean violation rates before and after driver re-education class

Driver Subgroup	Gender	Sample Size	Mean Rate Before	Mean Rate After	Mean Rate Change	Percent Rate Change	t-value	p-value
Young Drivers	F	284	3.50	1.27	-2.23	-64%	-15.95	< 0.0001
			(1.91)	(1.49)	(2.42)			
	M	2012	3.72	1.62	-2.10	-56%	-32.39	< 0.0001
			(2.39)	(1.83)	(2.91)			
Older Drivers	F	1150	2.33	1.04	-1.30	-56%	-20.95	< 0.0001
			(1.61)	(1.49)	(2.10)			
	M	2071	2.46	1.16	-1.30	-53%	-26.83	< 0.0001
			(1.91)	(1.50)	(2.30)			
Teen Drivers	F	2011	2.45	1.12	-1.33	-54%	-31.78	< 0.0001
			(1.43)	(1.44)	(1.87)			
	M	2016	2.83	1.84	-0.99	-35%	-17.67	< 0.0001
			(1.79)	(1.97)	(2.53)			

Notes: All t-tests are one-sided t-test, with the null hypothesis being: rate difference is ≥ 0 and the alternative hypothesis being: rate difference is < 0 . That is there is a reduction in the rate of violation. The numbers appearing in parentheses below the mean rate statistics for each subgroup are the standard deviation corresponding to the number above.

The mean time lag between when drivers completed a driver re-education class and when they committed their next violation was approximately 306 days for young and older drivers and 298 days for teen drivers. This difference was not statistically significant. The time lag was very similar to that observed for point advisory notices. As was the case with point advisory notices, there was significant variation in the mean time lag observed in the data for each subgroup.

Post-Intervention Crash Involvement

The results of the crash comparison analysis for driver re-education classes were far less conclusive. A comparison of crash involvement rates in the two-year period before and after drivers completed a driver re-education class reveals mixed results. Crash involvement rates among young and older drivers of both genders decreased in the two-year period following intervention; however the rate differences were statistically significant for only three of the subgroups—young drivers of both genders and female older drivers, not older male drivers. (See Table 21). This suggests that the value of the driver re-education classes in terms of reducing subsequent crashes among certain driver subgroups may be limited.

Table 21. Comparison of mean crash rates before and after driver re-education class

Driver Subgroup	Gender	Sample Size	Mean Rate Before	Mean Rate After	Mean Rate Change	Percent Rate Change	t-value	p-value
Young Drivers	F	284	0.45 (0.79)	0.30 (0.61)	-0.15 (0.96)	-33%	-2.728	0.0034
	M	2012	0.41 (0.72)	0.29 (0.61)	-0.12 (0.91)	-29%	-5.917	< 0.0001
Older Drivers	F	1150	0.30 (0.64)	0.24 (0.54)	-0.07 (0.82)	-23%	-2.747	0.0031
	M	2071	0.30 (0.64)	0.27 (0.61)	-0.03 (0.79)	-10%	-1.48	0.0695
Teen Drivers	F	2011	0.30 (0.59)	0.32 (0.58)	0.02 (0.83)	7%	0.838	0.7989
	M	2016	0.32 (0.64)	0.34 (0.63)	0.02 (0.89)	6%	1.246	0.8936

Notes: All t-tests are one-sided t-test, with the null hypothesis being: rate difference is ≥ 0 and the alternative hypothesis being: rate difference is < 0 . That is there is a reduction in the rate of violation. The numbers appearing in parentheses below the mean rate statistics for each subgroup are the standard deviation corresponding to the number above.

Also noteworthy is the fact that the absolute change in crash rates among teen drivers of both genders increased after completing the PDP re-education class. Although the observed rate differences were not determined to be statistically significant the fact that crash involvement rates increased among teen drivers after participating in the class

should be of concern to policy-makers. Once again, part of this difference is likely the result of greater exposure risk. In addition, it is important to note that the crash rates within each subgroup were highly variable. As was the case when assessing the effectiveness of point advisory notices for certain driver subgroups, these results make drawing definitive conclusions about the effectiveness of driver re-education in terms of reducing subsequent crash rates difficult for teen drivers especially.

In order to calculate mean time lag between intervention and when drivers were involved in their first crash after the intervention it was necessary to eliminate observations associated with drivers not involved in a crash in the two-year analysis window. The calculated mean time lag for drivers involved in a crash within the two-year period after completing a driver re-education class was approximately 325 days for young and older drivers and 337 days for teen drivers. This difference was not statistically significant and was generally consistent with the time lag observed for point advisory notices. There was significant variation in the mean time lag observed in the data for each subgroup.

Driver License Suspension + One Year Probation

The most severe negligent driver countermeasure used in New Jersey is driver's license suspension accompanied by one-year probation (referred to as license suspension only). Analysis results indicate that the license suspension is also the most consistently effective means of reducing violation recidivism and crash involvement among all negligent driver subgroups. The results are explained in more detail below.

Post-Intervention Violation Recidivism

A comparison of violation rates in the two-year period before and after driver's license suspension reveals that violation rates among drivers in all driver subgroups decrease substantially in the two-year period following intervention. License suspension results in the greatest overall reduction in violation recidivism with rate reductions ranging from 59 percent to 70 percent. As shown in Table 22, license suspension appears to be somewhat more effective for female drivers and young drivers of both genders, but rate reductions are very similar among all subgroups.

For all driver subgroups the rate differences were highly statistically significant. Again, there was significant variation between the rates of violation both before and after intervention in each driver subgroup. This is evidenced by the high standard deviation statistics provided in parentheses below the mean rate statistics in the table.

Part of the observed rate differences is likely due to lower exposure risk after intervention because drivers are expected not to drive during the duration of their suspension. Suspension times vary from thirty days to multiple years depending on the

reason for suspension. However, it is also true that many suspended drivers continue to drive during their suspension period. Some researchers have estimated that rates of driving while suspended are as high as 75 percent ^(18,19,31,33,34,35). Given the data available and uncertainty about driver behavior during suspension, it is difficult to quantify the extent to which exposure risk is reduced in the post-intervention period.

Table 22. Comparison of mean violation rates before and after license suspension

Driver Subgroup	Gender	Sample Size	Mean Rate Before	Mean Rate After	Mean Rate Change	Percent Rate Change	t-value	p-value
Young Drivers	F	2539	4.76	1.42	-3.34	-70%	-48.77	< 0.0001
			(3.00)	(1.89)	(3.45)			
	M	12543	4.97	1.76	-3.21	-65%	-95.2	< 0.0001
			(3.24)	(2.12)	(3.78)			
Older Drivers	F	6821	3.21	1.23	-1.98	-62%	-57.39	< 0.0001
			(2.44)	(1.68)	(2.86)			
	M	11842	3.31	1.29	-2.02	-61%	-72.83	< 0.0001
			(2.69)	(1.74)	(3.02)			
Teen Drivers	F	2598	3.69	1.33	-2.35	-64%	-43.65	< 0.0001
			(2.35)	(1.71)	(2.75)			
	M	2973	4.61	1.89	-2.72	-59%	-41.33	< 0.0001
			(3.01)	(2.18)	(3.58)			

Notes: All t-tests are one-sided t-test, with the null hypothesis being: rate difference is ≥ 0 and the alternative hypothesis being: rate difference is < 0 . That is there is a reduction in the rate of violation. The numbers appearing in parentheses below the mean rate statistics for each subgroup are the standard deviation corresponding to the number above.

The mean time lag between when drivers had their license suspended and when they committed their next violation was approximately 271 days for young and older drivers and 282 days for teen drivers. This difference was not statistically significant. Interestingly, the time lag for license suspension was slightly shorter than that observed for point advisory notices and driver re-education classes. This result could be because drivers in the license suspension subgroups are persistent and habitual violators and drivers convicted of serious moving violations. As such, drivers in these subgroups have exhibited more consistently negligent driving behavior over time and may therefore be more likely to reoffend and do so in a shorter period of time. As was the case with point advisory notices, there was significant variation in the mean time lag observed in the data for each subgroup.

Post-Intervention Crash Involvement

The results of the crash comparison analysis for license suspension were similarly clear. A comparison of crash involvement rates in the two-year period before and after license suspension revealed clear evidence that license suspension reduces crash rates in the two-year period after suspension. This was true for all population

subgroups. In all cases the crash rate differences were statistically significant. As shown in Table 23, the greatest reduction in crash rates was observed for young drivers of both genders. Similar, but somewhat lower, reductions were observed for the other driver subgroups. Teen male drivers demonstrated the lowest crash rate reduction. Once again, it is important to note that the crash rates within each subgroup were highly variable.

Mean time lag between license suspension and when drivers were involved in their first crash after the intervention was calculated using a method similar to the other interventions investigated. Observations associated with drivers not involved in a crash in the two-year analysis window were eliminated prior to calculating the time lag. The mean time lag for drivers involved in a crash within the two-year period after license suspension was approximately 343 days for young and older drivers and 367 days for teen drivers. This difference was not statistically significant and was slightly longer than the time lag observed for point advisory notices and driver re-education classes. There was significant variation in the mean time lag observed in the data for each subgroup.

Table 23. Comparison of mean crash rates before and after driver license suspension

Driver Subgroup	Gender	Sample Size	Mean Rate Before	Mean Rate After	Mean Rate Change	Percent Rate Change	t-value	p-value
Young Drivers	F	2539	0.52	0.23	-0.29	-56%	-15.524	< 0.0001
			(0.86)	(0.52)	(0.95)			
	M	12543	0.45	0.20	-0.25	-56%	-31.316	< 0.0001
			(0.76)	(0.48)	(0.88)			
Older Drivers	F	6821	0.34	0.20	-0.14	-41%	-14.017	< 0.0001
			(0.69)	(0.49)	(0.82)			
	M	11842	0.33	0.19	-0.14	-42%	-18.538	< 0.0001
			(0.71)	(0.49)	(0.81)			
Teen Drivers	F	2598	0.50	0.28	-0.22	-44%	-12.184	< 0.0001
			(0.78)	(0.56)	(0.94)			
	M	2973	0.42	0.29	-0.13	-31%	-7.492	< 0.0001
			(0.74)	(0.60)	(0.94)			

Notes: All t-tests are one-sided t-test, with the null hypothesis being: rate difference is ≥ 0 and the alternative hypothesis being: rate difference is < 0 . That is there is a reduction in the rate of violation. The numbers appearing in parentheses below the mean rate statistics for each subgroup are the standard deviation corresponding to the number above.

Comparison of Countermeasure Effectiveness

To examine how the three primary countermeasures combined with their secondary components compared in terms of effectiveness relative to one another we calculated the overall mean rate difference including all driver subgroups under each countermeasure and tested the difference between mean rate differences using Tukey's

standardized range test to determine if the means were statistically different from one another. The results of this test for violation rates and crash rates are presented in Table 24.

The analysis results indicate that the differences in mean rate reductions provided by each countermeasure are statistically significant at the 0.05 confidence level. License suspension results in the greatest overall reduction in mean violation rates in the two-year period after intervention. Driver re-education classes result in the lowest mean violation rate reduction. The same is true for crash rates.

Table 24. Tukey’s Studentized Range (HSD) test for violation and crash rate differences

Group Comparison	Difference between means	Simultaneous 95% Confidence Interval		
Mean violation rate comparison				
Driver re-education class compared to point notice + fee	0.648	0.563	0.733	***
Driver re-education class compared to license suspension	0.869	0.787	0.952	***
Point notice + fee compared to license suspension	0.222	0.162	0.281	***
Mean crash rate comparison				
Driver re-education class compared to point notice + fee	0.075	0.051	0.100	***
Driver re-education class compared to license suspension	0.129	0.105	0.152	***
Point notice + fee compared to license suspension	0.053	0.036	0.070	***

Notes: *** Comparisons significant at the 0.05 level; Z = Driver re-education class; N = Point notice + fee; O = license suspension

The same test was used to examine the comparative effectiveness of various levels of suspensions (i.e., A, B, C, persistent violator, and probationary driver). The analysis results indicated that the different levels of license suspension were not statistically different from one another.

It is important to note that the results presented above represent the combined effect of both the primary countermeasure and the secondary components of each. Past research studies that followed experimental design protocols have been able to examine the effect of discreet countermeasures. Those not employing experimental design generally have attributed effects to the primary countermeasure. Given the fact

that it was not possible to conduct this study using an experimental design it was not possible to isolate the proportion of the observed change in mean violation and crash rates attributable to each individual component.

A note of caution should be considered when interpreting the results of this study. In statistical analyses, certain study populations (e.g., students that perform poorly on standardized tests) or in this case poor drivers, are at the extreme end of a normally distributed population. In other words, the sample population we are looking at is not as heterogeneous as the general population may be. The nature of our comparison groups is such that they are all by definition negligent drivers. They therefore most likely exhibit higher rates of violation and crash involvement than the general population of drivers in the State.

In statistical terms, groups on the extreme ends of a normal population distribution have sometimes been observed to perform more like the “normal” population in any given comparison period just by chance. This phenomena is called regression-to-the-mean. As such, it could be true that some portion of the observed rate change documented in this study is due to regression-to-the-mean effects.

In at least one study similar to this ⁽³⁶⁾ researchers estimated that up to 80 percent of observed rate reductions might be due to regression-to-the mean effect. To investigate how much regression-to-the-mean effect may be present in the results found in this study a statistical correction formula was employed. However, the results of this investigation revealed no consistent pattern of effect. Absent a true control group from which to compare before and after effects, it is not possible to discern how much, if any, of the observed rate differences documented in this study are due to regression-to-the-mean. It seems clear however from the results presented in this section that there is strong evidence indicating that the negligent driver countermeasures used in New Jersey are effective at reducing violation and crash recidivism among most driver subgroups.

SUMMARY DISCUSSION AND CONCLUSIONS

This study provides important evidence that New Jersey's program of negligent driver countermeasures is effective at reducing violation and crash recidivism among most negligent driver subgroups in the two-year period after MVC intervention. Of the countermeasures used in New Jersey, the combination of license suspension with one year probation resulted in the greatest overall reduction in both mean violation and crash rates. Mean violation rates were observed to decline from 59 percent to 70 percent. Mean crash rates among those that had their license suspended declined somewhat less but still by a substantial 31 percent to 56 percent. These reductions are higher than generally found in past studies conducted in other states but very consistent with the national literature on the effectiveness of license suspension overall.

New Jersey's driver re-education classes which are accompanied by a three-point credit against accumulated demerit points and one year probation resulted in the lowest mean violation rate reduction. Reductions in mean violation rates among various driver subgroups ranged from a low of 35 percent among male teen drivers to a high of 64 percent for young female drivers. Reductions were also observed in mean crash rates in the two years after intervention for young and older drivers of both genders. However, mean crash rates were observed to increase in the two-year period after teen drivers of both genders completed driver re-education classes. These results are somewhat higher but generally consistent with previous studies conducted in other states.

Point advisory notices which are accompanied in New Jersey by a concurrent assessment of negligent driver fees (MVC "insurance surcharges") for experience drivers appear to be an effective early intervention, producing substantial reductions in both violation and crash recidivism among all driver subgroups except teen drivers. Observed reductions in mean violation rates ranged from 53 percent to 65 percent. Observed reductions in mean crash rates ranged from 7 percent to 29 percent. The notable exception is teen drivers. The observed difference may be in part due to the fact that teen drivers receiving a point advisory notice are not assessed negligent driver fees.

Although mean violation rates among female teen drivers that received a point notice dropped by 29 percent in the two-year period after intervention, the rate for male teen drivers was observed to increase by 12 percent. Mean crash rates for male and female teen drivers were observed to increase by 68 percent and 28 percent respectively in the two-year period after intervention. While these results are generally consistent with past studies in that they show mixed overall success, the observed rate reductions are substantially higher than those reported in the literature. This may be partially due to the fact that New Jersey's point notices are accompanied by the concurrent assessment of negligent driver fees on experienced drivers.

New Jersey is one of only five states in the Nation with a negligent driver fee program. The other states include Michigan, New York, Texas, and Virginia. Given the limited use of negligent driver fees, no published literature was found on the effectiveness of fees at reducing violation and crash recidivism. However, anecdotal reports and press coverage of New Jersey's point system and "insurance surcharge" program suggests that the imposition of surcharge fees may have an important deterrent effect for at least some drivers. In addition, it is likely that at least part of the difference between the mean violation and crash rate reductions observed for experienced drivers who were assessed fees and teen drivers who were not assessed fees is due to the imposition of those fees.

Several policy recommendations can be derived from this research. First, with regard to teen drivers, it appears that license suspension combined with one-year probation is the most effective countermeasure that consistently reduces violation and crash recidivism among teen drivers in the same order-of-magnitude as other driver subgroups. This is especially true when examining the effect of countermeasures on the driving performance of male teen drivers.

In March 2009, the New Jersey Legislature passed a bill requiring "holders of special learner's permits, examination permits, and provisional driver's licenses to display a decal on the motor vehicle they are driving so that it is apparent to law enforcement officers that the driver is the holder of such a permit or license."⁽³⁷⁾ New Jersey is the first state in the country to enact such a requirement. Also in 2008, the MVC rolled out a revised curriculum for the PDP driver re-education class. The revised curriculum focuses on motivating behavior change by helping students to understand the causes of negligent driving behavior. The former curriculum was focused on understanding driver responsibility, knowledge of laws and the programmatic consequences that may result from continuing to commit violations. The literature on driver training and re-education indicates that the revised curriculum may result in lower rates of crash recidivism. Finally, in September 2008, the New Jersey Attorney General issued a directive to municipal courts prohibiting zero-point plea bargaining by provisional license holders⁽²⁸⁾. This will for the most part eliminate the diversion of teen drivers out of the MVC's driver improvement programs.

These teen driver reforms are important. Each merits active monitoring and on-going evaluation. However, future consideration should be given to whether or not a "zero-tolerance" policy for motor vehicle violations and at-fault crashes should be applied to teen drivers. Despite the generally accepted practice of imposing progressively harsh sanctions against drivers who continue to exhibit negligent driving behavior, it may be appropriate to impose license suspension as an earlier intervention if the reforms already enacted don't result in meaningful change in teen driver safety outcomes.

The results of the analysis regarding license suspension are very clear. License suspension reduces rates of violation and crash recidivism among drivers subject to

sanction. However, the analysis provided no statistical evidence that the different levels of license suspension used by MVC produce different results. The current structure of the MVC license suspension program includes seven categories of suspension “triggered” by varying levels of driver experience and point accumulation over time. The period of suspension for each category varies depending on the category and the unique circumstances of the suspension. This structure is cumbersome and confusing. It also appears unnecessary given the analysis results. MVC should consider streamlining the suspension program to make it more straightforward and easier to administer.

Finally, as the findings of a study recently completed for MVC reveal, there has been a downward trend in the number of drivers subjected to MVC negligent driver countermeasures since approximately the year 2000. The number of drivers sanctioned by MVC has dropped approximately 36 percent since 1999 and 30 percent since 2000⁽³⁸⁾. While a number of factors may have contributed to this decline, the most obvious is the increase in zero-point plea bargaining observed over the same period of time.

According to the study, since July 2000 when the “unsafe operation” zero-point moving violation was created by the New Jersey Legislature, “the number of zero-point violations as a percent of total violations increased to almost 28 percent in the period 2001-2006. This compares to a rate of only 8.5 percent in the period 1997 to 2001, and represents an increase of more than 250 percent.”⁽³⁸⁾ The researchers concluded greater use of zero-point plea bargaining “has had the effect of diverting many negligent drivers out of MVC’s driver monitoring and control system which is designed to identify and address problem drivers.”⁽³⁸⁾

These findings and conclusions are significant and particularly problematic given the findings of this study which show that New Jersey’s negligent driver countermeasures are effective when imposed. As such, consideration should be given to reviewing and reforming, as necessary, New Jersey’s driver monitoring system and/or the practice of plea bargaining motor vehicle offenses to ensure that repeat traffic offenders are not able to use zero-point plea bargaining to avoid corrective actions that improve safety outcomes.

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