Specific Deterrent Evaluation of the Ignition Interlock Pilot Program in California

June 17, 2016

FINAL

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Governor

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California State Transportation Agency

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CALIFORNIA STATE TRANSPORTATION AGENCY

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June 17, 2016

The California Department of Motor Vehicles (DMV) is pleased to announce the release of the report on the "Specific Deterrent Evaluation of the Ignition Interlock Pilot Program in California." This report evaluates the effect of the Assembly Bill 91 (AB 91) pilot program on both driving under the influence (DUI) recidivism and crashes among DUI offenders.

AB 91 established a pilot program which required all DUI offenders in four California counties (Alameda, Los Angeles, Sacramento, and Tulare) to install an ignition interlock device (IID) on their vehicle for a specified period of time in order to obtain a restricted, reissued, and reinstated driver license.

DMV's evaluation of the AB 91 pilot program shows that:

- Pilot participants had lower DUI recidivism rates than other DUI offenders, but these lower rates significantly diminished over time.
- Individuals obtaining an IID-restricted license had a higher increase in crashes, including fatal/injury crashes, compared to DUI offenders whose licenses remained suspended or revoked.

Although the reduction in DUI recidivism provides evidence of benefits associated with IID restrictions, the increased crash risks associated with the AB 91 pilot program suggest that additional investigation and research could be beneficial. Inclusion of information regarding crash responsibility (i.e. at-fault/not-at-fault), alcohol involvement, or severity level (i.e., fatal/injury crashes versus property-damage only crashes) may provide further insight.

Future discussions regarding IID requirements should consider the effectiveness of IIDs as a single countermeasure or whether combining IIDs with driver license revocation or suspension actions and other countermeasures, could provide a more effective approach to enhancing traffic safety.

Based on the findings of this study, the Department recommends the following actions:

- Convene a task force including representatives from the Legislature, judiciary, law enforcement, and other public agencies to develop recommendations for strengthening components of California's comprehensive DUI countermeasure system.

- Evaluate the traffic safety benefits of the IID program implemented under Senate Bill 598, including the effectiveness of shortening a hard license suspension or revocation period for those DUI offenders who choose to obtain an IID-restricted license.

- Collaborate with representatives from the courts, law enforcement, and other entities to explore options for using IIDs as an effective DUI countermeasure, including using IIDs as an "alcohol-abstinence-compliance" monitoring tool in a modified version of the traditional DUI court model.

- Conduct and report to the Legislature an evaluation of prior studies on the effectiveness of DUI countermeasures in place in California (including IIDs). This report will offer recommendations on legislative reforms to both retain and/or expand effective countermeasures and revise and/or strengthen less effective countermeasures.

It may be beneficial to further evaluate the efficacy of using IIDs in conjunction with other countermeasures, including suspension and revocation, to increase public safety.

Sincerely,

JEAN SHIOMOTO
Director

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14. ABSTRACT

This study presents an evaluation of the specific deterrence effects of California's ignition interlock pilot program mandated by AB 91 to operate in four California counties — Alameda, Los Angeles, Sacramento, and Tulare — from July 1, 2010 to January 1, 2016. This study is a follow-up to an earlier legislatively-mandated *general* deterrence evaluation of AB 91's IID pilot program. The purpose of the present study is to evaluate the *specific* deterrent capacity of AB 91's IID pilot program, that is, whether it led to reductions in DUI recidivism and crashes among DUI offenders. Results show that, while the AB 91 pilot program can be associated with reductions in DUI recidivism among specific DUI offender groups, it is also associated with an increase in subsequent crashes among all first DUI offenders in AB 91 pilot counties and among all DUI offenders who installed an IID and obtained an AB 91 IID-restricted driver license. Although the reduction in DUI recidivism provides evidence of benefits associated with IID restrictions, the increased crash risks associated with the AB 91 pilot program suggest that additional investigation and research could be beneficial. Inclusion of information regarding crash responsibility (i.e. at-fault/not-at-fault), alcohol involvement, or severity level (i.e. fatal/injury crashes vs property-damage only crashes) may provide further insight. The report recommends to (1) evaluate California's incentive IID program mandated under Senate Bill 598, (2) conduct and report to the Legislature a quantitative evaluation of the efficacy of current or potential DUI countermeasures (including IIDs) and their combined use, (3) explore the option of using IIDs as an "alcohol-abstinence-compliance" monitoring tool, as part of a modified version of the traditional DUI court model, and (4) convene a task force to develop recommendations for strengthening components of California's comprehensive DUI countermeasure system.

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PREFACE

This report presents the results of a specific deterrent evaluation of an ignition interlock device pilot program in California. This pilot program was mandated by the California Legislature (per Assembly Bill 91, chaptered on October 11, 2009 – Feuer).

ACKNOWLEDGMENTS

EXECUTIVE SUMMARY

Background

As a result of determined and numerous efforts to combat driving under the influence (DUI) of alcohol, substantially fewer people are dying in alcohol-related crashes today than was the case 30 years ago. One such effort involves the use of ignition interlock devices (IID). These devices consist of an alcohol breath-testing unit that is connected to the ignition system of a vehicle. A driver must blow into the device and provide a breath sample to start a vehicle. If the breath sample indicates that a driver's blood alcohol concentration (BAC) level is higher than a pre-specified limit, the vehicle will not start.

Since their development in the 1960s, IIDs have become an integral part of various DUI intervention efforts and programs which require convicted DUI offenders to install an IID in their vehicle for a specific time period. Early versions of IID programs were mostly discretionary and managed by the courts, and over time the administration of these programs in the U.S. has been shifting from courts to states' driver licensing agencies, while some states have established a "hybrid approach" that combines components of both systems (United States Government Accountability Office, 2014). Currently, all states in the U.S. have laws authorizing use of IID devices to prevent impaired driving.

According to prior research evaluations of IID programs in the U.S. and internationally, IIDs are effective in reducing DUI recidivism rates as long as the IID is installed in the offender's vehicle. However, after the IID has been removed, this effect fades away, and recidivism rates tend to increase and to become equivalent to the levels of offenders who did not install an IID (Elder et al., 2011).

IIDs have been in use in California since the early 1990s when legislation was passed to authorize judges to order repeat DUI offenders to install IIDs in their vehicles (Fulkerson, 2003). Since then, several additional laws pertaining to IIDs have been enacted, with some requiring an evaluation of the effectiveness of IIDs mandated under a particular piece of legislation. A major evaluation study of California's IID program was conducted in 2005 that involved IID use among different groups of offenders. Overall, the study's results were mixed and revealed that IIDs can reduce subsequent DUI recidivism, but only in specific contexts and among specific groups of offenders. The results also showed that IIDs can be associated with a significant

increase in crash risk among offenders who installed an IID, which suggest, in essence, doubtful traffic safety benefits of IID devices (DeYoung, Tashima, & Masten, 2005).

On July 1, 2010, Assembly Bill (AB) 91 was implemented that added California Vehicle Code (CVC) Section 23700, establishing a pilot program in Alameda, Los Angeles, Sacramento, and Tulare Counties, from July 1, 2010 to January 1, 2016. This pilot program required all offenders convicted of first-time or repeat DUI offense (CVC 23152 and 23153) to install an IID on all vehicles they own or operate for a specified period of time in order to obtain a restricted, reissued, or reinstated driver's license. The required time period for the IID installation is based on the number of prior DUI convictions, and ranges from 5 months for first-time DUI offense to 48 months for a fourth or any subsequent DUI violation.

The AB 91 law required the DMV to report to the Legislature on the effectiveness of this pilot program and to determine whether the pilot program was associated with a reduction in first-time DUI violations and repeat DUI offenses of CVC Sections 23152 and 23153 in the pilot counties. As a result of this mandate, the general deterrent evaluation of the IID pilot program study was completed (Chapman, Oulad Daoud, & Masten, 2015).

That study examined the IID installation rates of convicted DUI offenders per their violation month, for each DUI offender level, separately for each pilot county, and for all non-pilot counties combined. Further, to evaluate the association of the IID pilot program with reductions in DUI offenses in the pilot counties, monthly rates of DUI convictions (combined with rates of alcohol- or drug-reckless convictions for some analyses) per 100,000 licensed drivers age 16 or older were calculated for each pilot county and for all non-pilot counties combined. The study used Auto-Regressive Integrated Moving Average (ARIMA) interrupted time series analyses as the analytical technique to compare the rates of DUI convictions before and after the IID pilot program implementation, adjusted for changes observed in the non-pilot counties and for other factors that may bias the rates comparison.

According to the study results, IID installation rates increased considerably during the pilot period in the pilot counties. Of all DUI offenders from all pilot counties combined, 42.4% installed an IID during the pilot period, compared to 2.1% during the pre-pilot period. IID installation rates among all DUI offenders in non-pilot counties increased modestly from 2.5% to 4.3% during the same time period. IID installation rates were highest among first DUI offenders (46.7%), followed by lower rates among second (33.2%) and third-or-more (15.7%) DUI offenders.

The results of the ARIMA time series analyses indicated that, after adjustments for changes observed in the non-pilot counties and other covariates, the license-based rates of DUI convictions among first, second, and third-or-more DUI offenders in the pilot counties during the pilot program were not significantly different from the rates of the same DUI offender groups during the pre-pilot period. Therefore, the main conclusion from this evaluation was that the AB 91 pilot program does not appear to be associated with a reduction in the number of first-time or repeat DUI convictions in the pilot counties.

This evaluation did not provide information about the specific deterrence effects of the AB 91 pilot program. Specifically, the study did not investigate whether the pilot program is associated with changes in the specific behavior of individual drivers who were convicted of DUI during the pilot program implementation period in one of the pilot counties and thus were subject to the IID pilot program requirements. Therefore, a recommendation was made to conduct a follow-up study to determine if the AB 91 pilot program has any specific deterrent effects.

Current Study

This study presents a specific deterrence evaluation of the AB 91 IID pilot program. The purpose of the study is to provide empirical evidence that may be used by policy-makers (and others) to consider the potential consequences—both intended and unintended—of broader expansion of the AB 91 IID program. To properly conduct such an evaluation, it is necessary to examine not just the intended (or presumed intended) outcomes of the program, but also certain unintended (or presumed unintended) outcomes. Toward that end, this study was designed to determine if the AB 91 pilot program, as it was implemented, is associated with differences in DUI recidivism and crashes between DUI offenders in the pilot counties who were subject to and complied with the IID pilot program requirements and those who were not subject to the pilot program. To accomplish this objective, two types of evaluations were conducted.

AB 91 Intent-To-Treat Evaluation

The AB 91 intent-to-treat evaluation was conducted separately for each of three DUI offender groups (first, second, and third and subsequent) by the way of comparing subsequent DUI recidivism and crash involvement of DUI offenders in the AB 91 pilot counties with the same type of offenders in non-pilot counties. These types of evaluations are characterized as "intent to treat" evaluations because they include all DUI offenders who were subject to the AB 91 law

regardless of whether or not they obtained an IID-restricted driver license and so complied with the law.

AB 91 IID/Restricted License Evaluation

As with the previous type of evaluation approach, the AB 91 IID/restricted license evaluation was completed separately for first, second, and third and subsequent DUI offenders. This evaluation involved a comparison of subsequent DUI recidivism and crash involvement of DUI offenders from the AB 91 pilot counties who complied with all pilot program requirements and obtained an IID-restricted license with an eligible comparison group of similar DUI offenders who did not obtain an IID-restricted license. That is, the comparison group consisted of offenders who were suspended or revoked during the study time period.

Method

Data on all drivers convicted of a DUI offense (CVC 23152) with violation dates from July 1, 2010 through June 30, 2013 were obtained from abstracts of conviction, which are reported to the Department of Motor Vehicles (DMV) by all California courts and stored on the Department's Driver Record Master (DRM) database. Data were extracted in January 2015 to allow enough follow-up time to conduct the outcome analyses for the three DUI offender groups (defined in detail in the following paragraph).

For all DUI offenders selected for the study, DUI offender level was used to differentiate between first, second, and third and subsequent DUI offenders. Separate outcome analyses were conducted for each DUI offender group due to considerable differences in their respective post-conviction licensing sanctions and associated AB 91 pilot program requirements to obtain an IID-restricted license and/or to reinstate a driving privilege. Likewise, the follow-up period for each DUI offender group varied from 12 months for the first DUI offender group, 30 months for the second DUI offender group, and 42 months for the third and subsequent DUI offender group.

It is assumed that a primary intended outcome of the AB 91 pilot program is a reduction in subsequent DUI recidivism. DUI recidivism can be measured in a relatively "pure" way by looking at subsequent DUI convictions (i.e., 2nd, 3rd, etc. offenses). There also exist closely-related phenomena that should be taken into account when attempting to measure alcohol-involved driving. For that reason, the analyses include a separate measure of subsequent DUI-related incidents that in addition to DUI convictions may also include pre-conviction

administrative per se (APS) suspensions, alcohol- or drug-involved crashes, and DUI Failure-to-Appear violations.

It is also possible for laws to have unintended effects. It may not always be possible to delineate the precise mechanisms that lead to these unintended effects. Nevertheless, it is presumed that any judgment as to the ultimate traffic safety value of a proposed program must take into account, when possible, unintended effects. To do otherwise would be to leave unexamined certain critical information about the overall impact of a program on the safety of the users of California's roads. Any proposed change to DUI sanctions may have an associated effect on crashes—even where that associated effect was unintended. Because alcohol and drug impairment plays an important role in a substantial proportion of fatal/injury crashes in California, it is therefore vital to understand, to the extent possible, both the intended and unintended effects that proposed changes to DUI sanctions may have on crash outcomes.

As stated above, two evaluations for each DUI offender group were conducted; (1) an overall AB 91 intent-to-treat evaluation and (2) an AB 91 IID/restricted license evaluation.

For the AB 91 intent-to-treat evaluation, all AB 91 eligible drivers convicted of a first, second, or third and subsequent DUI offense in the four pilot counties during the pilot program implementation period, regardless of whether they complied with the program requirements, were included in this evaluation. Comparison drivers consisted of those who were convicted of a first, second, or third and subsequent DUI offense in one of the non-pilot counties during the AB 91 pilot program implementation period.

For the AB 91 IID/restricted license evaluation, all drivers with a qualifying DUI offense in one of the AB 91 pilot counties who installed an IID and satisfied other requirements to receive an AB 91 IID-restricted license were identified for this evaluation. Comparison group drivers consisted of those convicted of the same offense (CVC 23152), who remained suspended or revoked following their qualifying DUI conviction and, therefore, did not receive a restricted driver license.

Post-conviction odds or hazards of a subsequent DUI conviction, DUI incident, and crash were compared between treatment and comparison groups for both evaluations. Statistical controls were employed at two levels to attenuate as much potential preexisting group bias as possible. The first was to match comparison drivers with treated AB 91 drivers on selected variables

through the use of propensity scores. The second was to remove as much remaining bias as possible during the analyses by using covariates in the final statistical models.

For both evaluations and for each DUI offender group, statistical models were developed separately for three outcome (criterion) measures: (1) days to first subsequent DUI conviction, (2) days to first subsequent DUI incident (i.e., APS suspension, alcohol- or drug-involved crash, DUI conviction, or DUI Failure-to-Appear violation), and (3) days to first subsequent crash (i.e., any traffic crash – property damage and/or injury/fatal reported to the Department by law enforcement or involved drivers).

Cox regression survival analysis was used to analyze all outcome measures. The hazard ratio, interpreted as a ratio comparing the odds of an outcome in one group to the odds of the outcome in a comparison group over the time period of the study, was used to describe the relationship between the outcome measure and the treatment effect (the AB 91 intent-to-treat, or the AB 91 IID/restricted license, as the case may be) in the current study.

Results

AB 91 Intent-To-Treat Evaluation

FIRST DUI OFFENDERS

- The AB 91 program is not associated with an increase or decrease in the odds or hazards of a subsequent DUI conviction over the 12-month time period.
- The AB 91 program is not associated with a reduction or increase in the odds or hazards of a subsequent DUI incident over the 12-month time period.
- First offenders in non-pilot counties have a 6.1% **lower** hazards or odds of a subsequent crash relative to those in the pilot counties over the 12-month time period.

SECOND DUI OFFENDERS

- Second offenders in non-pilot counties have a 10.8% **lower** hazard or odds of a subsequent DUI conviction relative to those in the pilot counties over the 30-month time period.
- Second offenders in non-pilot counties have a 16.2% **lower** hazard or odds of a subsequent DUI incident relative to those in the pilot counties over the 30-month time period.
- The AB 91 program is not associated with a reduction or increase in the odds or hazards of a subsequent crash over the 30-month time period.

THIRD AND SUBSEQUENT DUI OFFENDERS

- The AB 91 program is not associated with an increase or decrease in the odds or hazards of a subsequent DUI conviction over the 42-month time period.
- The AB 91 program is associated with a 16.7% **lower** hazard or odds of a subsequent DUI incident among the offenders in non-pilot counties relative to those in the pilot counties over the 42-month time period.

- The AB 91 program is not associated with a reduction or increase in the odds or hazards of a subsequent crash over the 42-month time period.

AB 91 IID/Restricted License Evaluation

FIRST DUI OFFENDERS

- The AB 91 IID/restricted license group is associated with a 73% lower odds or hazards of a subsequent DUI conviction over the first 182 days following their original DUI conviction relative to the comparison group of suspended drivers. During days 183 to 365, the AB 91 IID/restricted license group is associated with a 43% lower odds or hazards of a subsequent DUI conviction relative to the comparison group. Therefore, the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of subsequent DUI convictions; however, this trend tends to **diminish** over the 12-month study period.

- The AB 91 IID/restricted license group is associated with a 74% lower odds or hazards of a subsequent DUI incident over the first 182 days following their original DUI conviction relative to the comparison group of suspended drivers. During days 183 to 365, the AB 91 IID/restricted license group is associated with a 45% lower odds or hazards of a subsequent DUI incident relative to the comparison group. Therefore, the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of subsequent DUI incidents; however, this trend tends to **diminish** over the 12-month study period.

- The AB 91 IID/restricted license and the comparison groups do not significantly differ in their odds or hazards for a subsequent crash during the first 99 days following their original DUI conviction. During days 100 to 199, the AB 91 IID/restricted license group is associated with the odds or hazards of a subsequent crash that is approximately 1.57 times greater (56.8% higher) than the comparison group of suspended drivers. During days 200 to 365, the AB 91 IID/restricted license group is associated with the odds or hazards of a subsequent crash that is approximately 1.98 times greater (97.5% higher) than the comparison group. Therefore, the AB 91 IID/restricted license treatment group has a **higher** odds or hazards of subsequent crashes, and this trend **increases** over the 12-month study period.

SECOND DUI OFFENDERS

- The AB 91 IID/restricted license group is associated with a 67% lower odds or hazards of a subsequent DUI conviction over the first 364 days following their original DUI conviction relative to the comparison group of suspended drivers. During days 365 to 730, the AB 91 IID/restricted license group is associated with a 60% lower odds or hazards of a subsequent DUI conviction relative to the comparison group. During days 731 and subsequent following their conviction for a second DUI offense, the hazard ratio between the AB 91 IID/restricted license group and the comparison group is not statistically significant. Therefore, the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of subsequent DUI convictions. This trend **diminishes** over time, and after 730 days following the conviction of a second DUI offense, the difference between the treatment and comparison groups is no longer statistically significant.

- The AB 91 IID/restricted license group is associated with a 70% lower odds or hazards of a subsequent DUI incident over the first 364 days following their original DUI conviction relative to the comparison group of suspended drivers. During days 365 to 730, the AB 91 IID/restricted license group is associated with a 58% lower odds or hazards of a subsequent DUI incident relative to the comparison group. During days 731 and subsequent following their conviction for a second DUI offense, the hazard ratio between the AB 91 IID/restricted license group and the comparison group is not statistically significant. Therefore, the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of subsequent DUI incidents. This trend **diminishes** over time, and after 730 days following the conviction of a second DUI offense, the difference between the treatment and comparison groups is no longer statistically significant.

- The AB 91 IID/restricted license and the comparison groups do not significantly differ in their odds or hazards for a subsequent crash during the first 299 days following their original DUI conviction. During days 300 to 730, the AB 91 IID/restricted license group is associated with the odds or hazards of a subsequent crash that is approximately 1.58 times greater (58% higher) than the comparison group of suspended drivers. During days 731 and subsequent, the AB 91 IID/restricted license group is associated with the odds or hazards of a crash that is approximately 2.16 times greater (116% higher) than the comparison group. Therefore, the AB 91 IID/restricted license treatment group has a **higher** odds or hazards of a subsequent crash, and this trend **increases** over the 30-month study period.

THIRD AND SUBSEQUENT DUI OFFENDERS

- The comparison group of revoked subjects has an odds or hazards of a subsequent DUI conviction that is approximately 3.4 times higher than that associated with the AB 91 IID/restricted license group. Therefore, the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of a subsequent DUI conviction over the 42-month time period.

- The comparison group of revoked subjects has an odds or hazards of subsequent DUI incident that is approximately 3.4 times higher than that associated with the AB 91 IID/restricted license group. Therefore, the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of a subsequent DUI incident over the 42-month time period.

- The comparison group of revoked subjects has an odds or hazards of subsequent crashes that is approximately 33% less than of the AB 91 IID/restricted license group. Therefore, the AB 91 IID/restricted license treatment group has a **higher** odds or hazards of a subsequent crash over the 42-month time period.

Conclusions

The findings of the specific deterrence evaluation of the AB 91 pilot program indicated that there were either no differences in subsequent DUI recidivism and crash involvement of DUI offenders in the AB 91 pilot counties relative to those in the non-pilot counties or that some groups of DUI offenders from non-pilot counties have lower risk of a subsequent DUI recidivism and crash involvement relative to those in the pilot counties. Further, the findings of the current study show that IIDs can be associated with reduced subsequent DUI recidivism among specific DUI offender groups, but with a substantial increase in subsequent crashes among DUI offenders who installed an IID relative to suspended or revoked DUI offenders. It bears emphasizing that the current study found a strong and reliable association between possession of an AB 91 IID-restricted license and reduced DUI recidivism. Across all DUI offender levels, those with an IID-restricted license have lower odds or hazards of a subsequent DUI conviction, and lower odds or hazards of a subsequent DUI incident when compared to drivers with suspended or revoked licenses. For first DUI offenders these differences tend to diminish with time. For second offenders these differences disappear after approximately 2 years. For third DUI offenders the difference in subsequent DUI recidivism did not diminish over the 42-month follow-up period.

These study findings are generally consistent with those reported by DeYoung et al. (2005) and with other prior Departmental research showing driver license suspensions and revocations to be the most effective available countermeasure in reducing crash involvement (Gebers, 2009; Hagen, 1977; Rogers, 1995, 1997; Tashima & Marelich, 1989; Tashima & Peck, 1986).

The positive associations between AB 91 IID-restricted license and lower DUI recidivism among all DUI offender groups and its diminishing effects over time for some DUI offenders found in the current study are consistent with overall findings from other research studies. Specifically, other studies have also found that first and repeat DUI offenders with IIDs installed in their vehicles have substantially lower DUI recidivism rates than their corresponding DUI offender groups whose driver licenses are suspended. Similar to the current study findings, this positive effect diminishes once IIDs are removed from the offenders' vehicles (Elder et al., 2011; Roth, Voas, & Marques, 2007).

The study findings indicate a negative association between having an IID-restricted license and subsequent crash involvement for all DUI offender groups. For the first and second DUI offenders, higher crash risk among those with the AB 91 IID-restricted license increases over time relative to DUI offenders with a suspended license. Therefore, although the AB 91 IID program is associated with a significant reduction in DUI recidivism among all DUI offender groups, the program is also associated with an increase in crash involvement among all DUI offenders that are subject to the program. This is particularly problematic since a substantial proportion of these crashes are those involving injuries and/or fatalities (of the overall crash involvement measured in the study, the proportion of fatal/injury crashes ranged from mid-30% to low-40% for different DUI offender groups—which is consistent with what prior California evaluations have reported for these offender groups).

The crash outcome findings of the current study are of primary importance since traffic crashes and costs associated with the resulting injuries, fatalities, and property damage are a direct and quantifiable measure of the traffic safety effects of a given program. Consequently, given that the AB 91 pilot program as implemented is associated with an increase in crash risk among DUI offenders who complied with AB 91 program requirements and obtained an IID-restricted license when compared to drivers with a suspended or revoked license, the traffic safety benefits of this program are potentially marginalized by the greater safety toll of an increased propensity for traffic crash involvement.

The analytical approach taken in this study rests in part on a basic assumption that the state's interest in reducing the number of DUI incidents ultimately derives from the demonstrated fact that impaired driving is intimately tied to a huge toll in economic costs and human suffering. In short, any hoped-for reduction in the number of DUI incidents is assumed to be a means to an end—the preservation of life and health among the users of our roads—and never exactly an end in itself. Similarly, any hoped-for reduction in DUI recidivism is assumed to be a means to reduce the public-health threat impaired drivers pose to themselves and others in terms of traffic crash involvement.

Due to the quasi-experimental nature of this evaluation that was necessitated for this evaluation of the AB 91 IID pilot program, it cannot be scientifically predicted what the expected reduction in DUI recidivism (2nd, 3rd, etc., DUI convictions and DUI incidents) would be more broadly implemented. That number is certainly greater than zero, and could be in the thousands. By the same token, it also cannot be precisely predicted what the expected increase in crashes, including fatal/injury crashes, would be were this AB 91 IID pilot program to be with a broader implementation. That number is certainly greater than zero, and could be in the hundreds.

Consistent with the recommendations from DeYoung et al. (2005), the IID requirement should continue to be evaluated as a potential DUI countermeasure in California. For example, driver license suspension or revocation actions could be combined with IID requirements, as these two countermeasures may help reduce alcohol-related incidents in different ways. The effectiveness of driver license suspension has been documented in numerous prior California studies since the late 1970s both as an overall traffic safety countermeasure and as, most relevant in this context, a DUI countermeasure (Hagen, 1977; Tashima & Peck, 1986; Tashima & Marelich, 1989; Rogers, 1995, 1997; Gebers, 2009).

The importance of sustained use of hard license suspension or revocation actions as a DUI countermeasure is particularly relevant in regards to APS suspension or revocation actions. Namely, prior research has shown that APS license suspensions or revocations have statistically significant and substantially important effects in reducing alcohol-related fatal crash involvement (Wagenaar & Maldonado-Molina , 2007; Rogers, 1995, 1997). In her two studies, Rogers has shown that California's APS law from 1990 have both general (1995) and specific (1997) deterrent effects. Specifically, because of their swiftness and certainty of punishment (immediately upon DUI arrest), APS suspension and revocation actions are very well in sync with the main deterrence theory postulates (Ross, 1982) and continued requirement for hard

license suspension or revocation for a pre-specified minimum time period, as prescribed under California's APS law, should be preserved.

Overall, driver license actions should continue to be an integral part of the DUI countermeasure system in California. As Helander (2002) noted in the past legislatively-mandated review of scientific evidence on effective DUI countermeasures, driver license suspensions are among the most proven-effective DUI countermeasures whose integrity should be maintained. He further argued that new DUI laws and programs should "not diminish or work at cross-purposes to laws and programs that are effective . . ." (p. 27) as are license suspension/revocation actions. DeYoung (2013) also reasoned that, in addition to being effective traffic safety countermeasures, driver license suspension and revocation actions are inexpensive and relatively easy to administer.

One promising solution that addresses a need to preserve the use of suspensions and revocations and combines it with ignition interlock is the IID program legislated under SB 598 (Statutes of 2009, Chapter 193, Huff – see Appendix E). This law offers an incentive for alcohol-only second and third misdemeanor DUI offenders to shorten their required suspension/revocation period provided they install an IID. Consequently, SB 598 offers potentially optimal use of both licensing actions and IID countermeasures, and, therefore, the effectiveness of this particular law should be evaluated. In addition, SB 598 potentially addresses obvious shortcomings of AB 91 and other existing IID programs in the state. Specifically, the IID program under SB 598 law "recognizes" that IIDs prevent drivers from driving under the influence of alcohol and have no value in preventing them from driving under the influence of drugs. Although SB 598 law shortens required suspension or revocation period for eligible DUI offenders, it does not completely eliminate licensing actions. Thus, instead of being completely eliminated, driver license suspension or revocation actions could be combined with IID requirements as these two measures may help reduce alcohol-related incidents in different ways. However, before these two countermeasures are combined, it needs to be determined what are the most appropriate or optimal periods of hard license suspension or revocation that different types of DUI offenders need to serve prior to obtaining an IID-restricted license. As DeYoung (2013) emphasized, shortening license suspension too drastically might result in eliminating significant general deterrent effect of license suspension, a move which compromises overall traffic safety.

DUI offenders in California are currently subject to a combination of various sanctions, penalties, and interventions relative to their DUI offender status and aimed at preventing them from future impaired driving and crash-involved episodes. The effectiveness of each of these

sanctions and penalties varies depending on different circumstances such as whether they are implemented alone or in combination with others. There is a tendency over time to add new requirements or introduce new programs that DUI offenders must comply with in order to relicense. However, as DeYoung argued in his recent paper (2013), continuing to add new requirements may result in discouraging DUI offenders altogether from complying with all conditions to reinstate their driving privilege and indirectly forcing them out of reach of the post-licensing control system. Therefore, before a new requirement is added to the already complicated set of DUI countermeasures in California, any such new requirements must demonstrate "convincing traffic safety benefits" (DeYoung, 2013).

Recommendations

The results of the analyses presented in this report clearly show that the IID-restricted license program, as implemented in the 4-county pilot authorized under AB 91, has mixed traffic safety impacts. There is strong evidence of a reduction in DUI recidivism, across all offender levels, among those obtaining an IID-restricted license under the provisions of this law. However, there is also strong evidence of a consistent increase in crashes, including fatal/injury crashes, among these same drivers. The state has a compelling interest in reducing the toll of motor vehicle-related injuries and fatalities. This interest is expressed in the state's commitment to the Strategic Highway Safety Plan and is in keeping with associated federal laws and regulations, such as MAP-21 ("Moving Ahead for Progress in the 21st Century," P.L. 112-141). Although the reduction in DUI recidivism provides evidence of benefits associated with IID restrictions, the increased crash risks associated with the AB 91 pilot program suggest that additional investigation and research could be beneficial. Inclusion of information regarding crash responsibility (i.e. at-fault/not-at-fault), alcohol involvement, or severity level (i.e. fatal/injury crashes vs property-damage only crashes) may provide further insight. The following recommendations are therefore offered based on the findings of this study.

1. The Department should implement its planned evaluation of SB 598. An evaluation of the traffic safety benefits of the IID program legislated under this law is important because it will determine how effective is the shortening of the proven-effective countermeasure of a hard license suspension or revocation period among qualifying DUI offenders when offered the option of an IID-restricted license. If found effective, SB 598 could be adopted and/or incorporated into a new comprehensive IID program for drivers convicted of alcohol-related DUI offenses.

2. The Department should conduct and report to the Legislature a quantitative evaluation of prior California studies focusing on the efficacy of DUI countermeasures already in place in California. This report would offer recommendations for legislative reform as to which existing countermeasures are more effective and should be retained and/or expanded and which countermeasures are currently less effective and therefore should be revised and strengthened. Such an effort would involve the application of a meta-analytical technique focusing on potential topical areas such as (1) driver-based countermeasures (e.g., minimum drinking-age laws, admin per se laws, lower per se BAC for repeat offenders, public information and education); (2) vehicle-based countermeasures (e.g., IID, vehicle impoundment); and (3) other countermeasures that have an impact on alcohol-impaired driving (e.g., DUI Court and alcohol beverage control). The results will assist lawmakers and traffic safety administrators in proposing and implementing DUI countermeasures that are potentially effective and, therefore, reduce the risk of unintended consequences such as increased crash risk.

3. The Department should work with representatives from the courts, law enforcement, and other involved entities, through the Strategic Highway Safety Plan (SHSP) process or otherwise, to explore options for the use of IIDs as a potentially effective DUI countermeasure. Specifically, there are some recent attempts in California (such as in San Joaquin County) that include using IIDs as an "alcohol-abstinence-compliance" monitoring tool, as part of a modified version of the traditional DUI court model. In addition to IID use, this DUI court model encompasses the use of an alcohol detection ankle bracelet for two different levels of court supervision and treatment monitoring of convicted repeat DUI offenders. This approach offers potentially promising results; further investment and exploration of this or similar efforts may result in empirical evidence to support the effective use of IIDs as a DUI and traffic safety countermeasure.

4. The Department should convene a task force, including representatives from the judiciary, law enforcement, and other public or private agencies whose work includes oversight, administration, or enforcement of various aspects of the DUI countermeasure system. The purpose of this task force would be to develop recommendations for further actions (including potential model legislation), for strengthening components of California's comprehensive DUI countermeasure system (e.g., IIDs, suspension and revocation actions, DUI courts, vehicle impoundment, DUI treatment program, etc.). These recommendations for further actions may be based on the information gathered as

part of recommendations #1, #2, and #3 (above), and other research findings or policy considerations where appropriate.

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INTRODUCTION

As a result of determined and numerous efforts to combat driving under the influence of alcohol, substantially fewer people are dying in alcohol-related crashes today than was the case 30 years ago. Regardless, lives continue to be lost every year in crashes where alcohol was involved and the "battle" with this traffic safety problem is far from done. According to the most recent information available, after 4 consecutive years of decline, the number of people dying in alcohol-involved crashes in California is again on the rise in the past 3 years with 1,197 lives lost in 2013. In addition, the percentage of alcohol-involved crash fatalities (of the total number of crash fatalities) in California averaged approximately 39% in the last 8 years, which is an increase from the value of 31% reported 15 years ago (Oulad Daoud, Tashima, & Grippe, 2015; Tashima & Helander, 2005).

Ignition interlock devices (IID) have been widely used in an attempt to prevent driving under the influence (DUI) of alcohol since their development in the 1960s. These devices consist of an alcohol breath-testing unit that is connected to the ignition system of a vehicle. A driver must blow into the device and provide a breath sample to start a vehicle. If the breath sample indicates that a driver's blood alcohol concentration (BAC) level is higher than a pre-specified limit, the vehicle will not start. Accordingly, IIDs have become an integral part of various DUI intervention efforts (and proposed efforts) which require (or would require) convicted DUI offenders to install an IID in their vehicle for a specific time period.

Recent Trends in Use and Evaluations of IID Programs

The implementation of IID programs has increased greatly over time to the point that currently all states in the U.S. have laws authorizing the use of IID devices to prevent impaired driving. Early versions of IID programs were mostly discretionary and managed by the courts. Over time, the administration of these programs in the U.S. has been shifting from courts to states' driver licensing agencies, while some states have established a "hybrid approach" that combines components of both systems (United States Government Accountability Office, 2014). One of the main problems associated with use of the IID device was its susceptibility to circumvention attempts. Since its development, IID technology has improved by adding components that allow better prevention of potential circumvention attempts such as a retest system (driver must submit breath samples at random times after the engine is started) or a data recording system that captures information related to IID usage (i.e., BAC logs, the vehicle mileage and time interval

when the vehicle was driven, etc.). Nonetheless, IIDs remain vulnerable to bypassing efforts, some of which are very simple, such as driving another vehicle without an IID (DeYoung, Tashima, & Masten, 2005).

Like other more punitive DUI prevention efforts, IID programs are predominantly focused on repeat DUI offenders (those with at least one prior DUI conviction or an offense considered as prior for DUI) due to well-established evidence that these offenders struggle to change their drinking and driving behavior (Marques, Voas, Roth, & Tippetts, 2010). Still, there have been some attempts to use IIDs for first DUI offenders. One such effort, whose traffic safety benefits were recently investigated, occurred in Washington State, which enacted two IID laws affecting first DUI offenders in 2003 and 2004 respectively (McCartt, Leaf, Farmer, & Eichelberger, 2013). The first law change, implemented in 2003, transferred the issuance of IID orders from the courts to the driver licensing department. The second law change, implemented in 2004, extended the issuance of IID orders from first time DUI offenders with BAC level 0.15% and above ('high BAC') or who refused the alcohol test ('test refusal'), to include first 'simple' DUI (with BAC below 0.15%) offenders. According to the study findings, only one-third of the 'simple' first DUI offenders ultimately installed an IID following the 2004 law change (instead of complying with IID requirement, these offenders had an option to be suspended for 1 year, after which they were able to apply for license reinstatement). However, the study results revealed a significant reduction in the recidivism rates associated with the same law change for the 2-year follow up period. Specifically, cumulative recidivism rates of first 'simple' DUI offenders decreased by an estimated 12% in the 2-year time period, while all first DUI offenders ('simple', 'high BAC', and 'test refusal' first DUI offenders combined) had an 11% lower recidivism rate in the same time period. The study authors claimed that a decline in recidivism rates could have been greater if larger proportion of first DUI offenders installed IIDs. The study also found an 8% reduction in single-vehicle late-night crashes associated with the 2004 law change. In January 2011, the State of Washington implemented mandatory IID installation orders that can be lifted only after a driver has had an IID installed for at least the last 4 months of their mandatory installation period (without any reports of noncompliance).

According to prior research studies, when DUI offenders who are ordered to install an IID have an alternative option, they will choose that option rather than comply with an IID installation order. For example, if they can be exempted from the IID requirement by claiming not to own a vehicle, they will do that. Or, if allowed by law, DUI offenders will rather serve a full suspension period than to have an IID-restricted license. In some instances, they might even risk driving on a suspended/revoked license (Elder et al., 2011; Marques, Voas, Roth, & Tippetts, 2010; Voas,

Tippetts, & Grosz, 2013). Consequently, some states have established mandatory IID programs that require IID installations for a specified time period as a condition for full reinstatement of the driver's license, while other states have attempted to enhance the compliance with the IID order by using some "less desirable" alternative sanctions if the DUI offender does not want to comply with the IID order. New Mexico and Florida used such mandatory IID programs, whose evaluation results are summarized below (Marques et al., 2010; Voas et al., 2013).

In New Mexico, Santa Fe County, in collaboration with magistrate judges, mandated IID installation for all first and repeat DUI offenders with house arrest as the alternative option for those "who claimed to have given up driving or otherwise could not install an interlock" (Marques et al., 2010, p. 71). As a result, the Santa Fe Magistrate Court achieved a 71% IID installation rate during the 2-year period compared to the 13% installation rate detected in other New Mexico courts, where IID is mandated for aggravated (BAC of 0.16% or higher) first and repeat DUI offenders. The recidivism rates for the offenders from the IID group who installed an IID were 2.5 times lower than the rates of DUI offenders who did not install an IID 1 year after conviction. However, the Santa Fe County program ended after a district judge determined that magistrate judges did not have the authority to impose the mandatory use of house arrest on DUI offenders who did not comply with the IID requirement.

Florida made an attempt to use IID installation for a pre-specified time period as a prerequisite for license reinstatement. In 2002, the state implemented the administrative reinstatement interlock program (ARIP), which imposed the above-specified IID installation requirement on all repeat DUI offenders, first DUI offenders with a BAC of 0.20% or higher, and on first DUI offenders who had a minor in the vehicle at the time of arrest. The evaluation of the ARIP program revealed that about half of offenders who completed their license revocation did not reinstate their licenses because they did not meet all license reinstatement requirements. The results further indicated that about 48% of first DUI offenders, 60% of second, and 55% of third DUI offenders who completed the hard revocation period installed the ordered IID. The authors of the study concluded that for all offenders who installed an IID, the recidivism rate was lower when the IID was actually installed on the vehicle than after it was removed. However, this conclusion appears to be based on descriptive statistics alone because the authors presented no inferential statistical tests. Thus, no strong conclusions regarding those differences can be drawn (Voas et al., 2013).

Overall, predominant evidence from different IID program evaluations in the U.S. and internationally have consistently indicated that IIDs are effective in reducing DUI recidivism

rates as long as the IID is installed in the offender's vehicle. However, after the IID has been removed, this effect fades away, and recidivism rates tend to increase and to became equivalent to the levels of offenders who did not install an IID (Elder et al., 2011).

History of IID Programs in California

California is recognized as the first state to establish and evaluate one of the early IID intervention pilot programs (EMT Group, 1990). It was also the first state to pass legislation that authorized judges to order repeat DUI offenders to install IIDs in their vehicles (Fulkerson, 2003). The first legislation gave judges discretionary authority to order IIDs for repeat DUI offenders. However, shortly after, it became obvious that judges were not sentencing most qualified repeat DUI offenders with the IID installment requirement. Consequently, follow-up legislation was enacted in 1993. Assembly Bill (AB) 2851 removed the discretionary component of the original IID law and required judges to order all repeat DUI offenders to install IIDs (DeYoung et al., 2005). Still, judges persisted in not requiring repeat DUI offenders to install IIDs, which is evident in the annual report of the California DUI Management Information System that continues to indicate that fewer than 20 percent of repeat DUI offenders receive the court order to install an IID in their vehicles (Oulad Daoud et al., 2015).

In 1999, new legislation was implemented, AB 762, which overturned the previous IID law and added new provisions that, in addition to repeat DUI offenders, focused on persons convicted of violating California Vehicle Code (CVC) Section 14601.2 (driving while suspended for DUI conviction). Under the new legislation, persons convicted of driving while suspended or revoked for a DUI offense were required to install an IID for a period not to exceed 3 years or until their driving privilege is reinstated. What made these offenders the next logical candidates for a mandatory IID law was a notion that they had already demonstrated that they present a risk to others on roads as they had been caught while driving on a suspended or revoked license for a DUI offense (DeYoung et al., 2005).

Among additional provisions, the AB 762 law provided an incentive for repeat DUI offenders to reinstate early if they install an IID. The law also encouraged judges to use their discretionary authority to order first DUI offenders to install an IID if there are aggravating factors associated with their DUI offense, such as high BAC (defined as 0.20% or above at the time of the original law implementation or 0.15% under the current law), chemical test refusal, numerous traffic violations, or involvement in injury crashes.

AB 762 also required the Department of Motor Vehicles (DMV) to conduct an evaluation of the implementation of IID laws in California and an evaluation of the effectiveness of the AB 762 law in reducing recidivism rates among persons convicted of DUI (violations of CVC 23152 or 23153), and vehicle crashes related to the use of IID devices. The effectiveness evaluation study was comprised of six smaller studies where each study examined the effectiveness of IIDs in a different setting among either specific groups of DUI offenders or among persons convicted of driving while suspended for DUI offense (DeYoung et al., 2005). Four of the six studies evaluated the court-administered IID program through an IID installation order assignment or through a restriction to drive only a vehicle equipped with an IID. The two other studies narrowed their focus on the effectiveness of IIDs only among offenders who installed an IID in their vehicles. The DUI recidivism (measured by subsequent DUI convictions and DUI incidents) and crash rates were compared between IID and comparison groups.

Three studies involved persons convicted of driving while suspended for DUI offenses (DWS-DUI). The results of the first two studies indicated that DUI recidivism was not statistically different between the DWS-DUI offenders with an IID court order or with a restriction to drive only a vehicle equipped with an IID and those who did not receive the same IID order or IID restriction. However, DWS-DUI offenders who were ordered by courts to install an IID or who were restricted to drive only a vehicle equipped with an IID had significantly lower crash risk (24% in the first and 42% the second study) than those who did not receive the same IID court order or IID restriction. The third study focused on both DWS-DUI and DUI offenders who actually installed an IID in their vehicles. The results indicated significantly lower DUI recidivism (18%) of the DWS-DUI and DUI offenders who installed IIDs when compared to the same type of offenders who did not install an IID. At the same time, DWS-DUI and DUI offenders who installed an IID in their vehicles had substantially higher crash risk (84%) than those who did not install an IID.

The other three studies focused on DUI offenders only. The first two studies involved, separately, first and second DUI offenders with an IID court order or restriction and the last study concentrated on second DUI offenders who installed an IID device. The evaluation results among first DUI offenders indicated that IID court order or IID restriction was not associated with reductions in their subsequent DUI recidivism, thus suggesting that the IID program was not effective for first DUI offenders. Similar results were found when the relationship between IID court order or restriction and subsequent DUI conviction was examined among second DUI offenders. However, second DUI offenders with an IID court order or restriction had 13% lower risk of subsequent DUI incidents and 19% lower risk of a subsequent crash than second DUI

offenders in the comparison group. Finally, the evaluation results among second DUI offenders who installed an IID indicated that these offenders had statistically different subsequent DUI recidivism and crash risk when compared to second DUI offenders who remained suspended. Specifically, the study results showed a directional but not statistically significant reduction in subsequent DUI convictions between the IID and the comparison group. However, second DUI offenders from the IID group had 41% lower risk of subsequent DUI incidents than second DUI offenders who were suspended. Also, second DUI offenders installing an IID had substantially higher (130%) risk of a subsequent crash than suspended second DUI offenders.

Overall, the 2005 evaluation study results are mixed as was pointed out by the authors of the study (DeYoung et al., 2005). While the study results showed IIDs can, in specific contexts and among specific groups of offenders, reduce subsequent DUI recidivism, the results also indicated that IIDs can be associated with a substantial increase in crash risk, particularly among offenders who installed an IID, which makes the overall traffic safety benefit of IID devices, based on the study results, questionable.

In the decade following the AB 762 law, two legislative bills pertaining to IID programs in California were enacted. The first law, AB 979, was implemented in 2006 and reduced the mandatory suspension/revocation period for repeat DUI offenders from a 12 to 30 month range to just 12 months if these offenders obtain an IID-restricted driver license. The second law, Senate Bill (SB) 1388, implemented in 2009, transferred regulatory authority for the administration of all mandatory IID programs in California from the state courts to the DMV. The law also authorized DMV to require any driver convicted of driving with a suspended or revoked license, due to a prior DUI offense, to install an IID in any vehicle that the driver owns or operates.

On July 1, 2010, two IID-related legislations were implemented in California: SB 598 and AB 91. SB 598 (see Appendix E) allowed second and third offenders convicted of an alcohol-only misdemeanor DUI offense (CVC 23152) the option of obtaining a restricted driver's license after completing a 90-day suspension period for a second misdemeanor DUI, or a 6-month suspension period for a third misdemeanor DUI if they, among other conditions, installed an IID. These offenders were required to have an IID-restricted driver's license for the duration of their original license suspension period. In addition, a third bill, SB 895, effective June 22, 2010, provided clean-up legislation for SB 598 and terminated the 1-year Administrative Per Se (APS) license suspension if a person has been convicted of a misdemeanor DUI and the person meets

all specified conditions for a restricted license under the SB 598 law including the installation of an IID.

The AB 91 IID Pilot Program

AB 91 (see Appendix A) added CVC Section 23700, establishing a pilot program in Alameda, Los Angeles, Sacramento, and Tulare Counties, from July 1, 2010 to January 1, 2016. This pilot program required all offenders convicted of first-time or repeat DUI offense (CVC 23152 and 23153) to install an IID on all vehicles they own or operate for a specified period of time in order to obtain a restricted, reissued, or reinstated driver's license. The required time period for the IID installation is based on the number of prior DUI convictions, and it ranges from 5 months for first-time DUI offense to 48 months for a fourth or any subsequent DUI violation.

DUI offenders that are subject to the AB 91 pilot program are identified through the process of DMV receiving an abstract of a conviction of CVC Sections 23152 or 23153 from the courts in one of the four pilot counties for violations between July 1, 2010 and January 1, 2016. Subsequent to receiving the court abstract, the DMV is required to send a letter (see Appendix B) to the pilot-program participants informing them of the IID installation and other program requirements. The cost of the IID installation and maintenance is the responsibility of the DUI offender. However, if the DUI offender's income is below the federal poverty level, the IID providers are responsible for absorbing a predetermined percentage of the cost, according to the formula stated in the AB 91 law.

Drivers who are subject to AB 91 may qualify for an exemption, within 30 days of receiving notice from DMV regarding the IID requirement, if they do not own or have access to a vehicle. The exemption requests are thoroughly examined by DMV before they are approved.

In addition, AB 91 also required the DMV to report to the Legislature, by January 1, 2015, on the effectiveness of the pilot program "in reducing the number of first-time violations and repeat offenses of CVC Sections 23152 and 23153 in the Counties of Alameda, Los Angeles, Sacramento, and Tulare." As a result, the general deterrent evaluation of the IID pilot program study was completed (Chapman, Oulad Daoud, & Masten, 2015). To respond to the legislative requirement specified in the AB 91 law, this evaluation encompassed the analyses of data <u>at the general county level</u> (i.e., general deterrence). Data on California drivers convicted of a DUI offense from July 1, 2007 to June 30, 2013, obtained from abstracts of convictions reported to DMV by California courts, were used in the study (data on alcohol- or drug-reckless convictions

–CVC 23103.5—were also included in some of the analyses). The conviction data were aggregated by county (i.e., differentiating between the pilot counties and non-pilot counties combined), conviction type (DUI or alcohol- or drug-reckless), DUI offender level (first, second, and third-or-more), and violation date (month/year).

The study examined the IID installation rates of convicted DUI offenders per their violation month, for each DUI offender level, separately for each pilot county, and for all non-pilot counties combined. Further, to evaluate the association of the IID pilot program with any reduction in DUI offenses in the pilot counties, monthly rates of DUI convictions (combined with rates of alcohol- or drug-reckless convictions for some analyses) per 100,000 licensed drivers age 16 or older were calculated for each pilot county and for all non-pilot counties combined. The study used Auto-Regressive Integrated Moving Average (ARIMA) interrupted time series analyses as the analytical technique to compare the rates of DUI convictions before and after the IID pilot program implementation, adjusted for changes observed in the non-pilot counties and for other factors that may bias the rates comparison.

According to the study results, IID installation rates increased considerably during the pilot period in the pilot counties. Of all DUI offenders from all pilot counties combined, 42.4% installed IID during the pilot period compared to 2.1% during the pre-pilot period. IID installation rates among all DUI offenders in non-pilot counties increased modestly from 2.5% to 4.3% during the same time period. IID installation rates were highest among first DUI offenders (46.7%), followed by lower rates among second (33.2%), and third-or-more (15.7%) DUI offenders.

The results of the ARIMA time series analyses indicated that, after adjustments for changes observed in the non-pilot counties and other covariates, the license-based rates of DUI convictions among first, second, and third-or-more DUI offenders in the pilot counties during the pilot program were not significantly different from the rates of the same DUI offender groups during the pre-pilot program.

Similar results were found when the adjusted license-based rates of combined DUI and alcohol- or drug-reckless convictions were compared. There were no differences in those rates among first, second, and third-or-more offenders between the pre-pilot and the pilot period. The only difference was found when the adjusted license-based rates of combined DUI and alcohol- or drug-reckless convictions were compared among second DUI offenders collectively in all pilot

counties, which indicated 3.7% higher rates during the pilot period than during the pre-pilot period.

Consequently, the main conclusion from the legislatively-mandated general deterrent evaluation of the AB 91 IID pilot program was that this program does not appear to be associated with a reduction in the number of first-time or repeat DUI convictions in the pilot counties. Still, it was important to assess if the pilot program has the capacity to provide a general deterrent effect on the general population of California drivers before they eventually engage in drinking and driving behavior including those that are not yet, but might potentially become, DUI offenders.

However, this evaluation did not provide information about the specific deterrence effects of the AB 91 pilot program. Specifically, the study did not investigate whether the pilot program is associated with changes in the specific behavior of individual drivers who were convicted of DUI during the pilot program implementation in one of the pilot counties and thus were subject to the IID pilot program requirements. Therefore, the current study was conducted as a follow-up to determine if the AB 91 pilot program has any specific deterrent effects. In addition, it was strongly recommended in the 2015 general deterrent evaluation that no legislative action, such as the statewide implementation of the pilot program, be taken until the specific deterrence evaluation is completed.

Evaluation Objective

The present study presents a specific deterrence evaluation of the AB 91 IID pilot program. The purpose of the study is to provide empirical evidence that may be used by policy-makers (and others) to consider the potential consequences—both intended and unintended—of broader expansion of the AB 91 IID program. To properly conduct such an evaluation, it is necessary to examine not just the intended (or presumed intended) outcomes of the program, but also certain unintended (or presumed unintended) outcomes.

It is assumed that a primary intended outcome of the AB 91 pilot program is a reduction in subsequent DUI recidivism. DUI recidivism can be measured by looking at subsequent DUI convictions or at subsequent DUI-related incidents.

It is also possible for laws to have unintended (i.e., an increase in crashes) effects. It may not always be possible to delineate the precise mechanisms that lead to these unintended effects. Nevertheless, it is presumed that any judgment as to the ultimate traffic safety value of a

proposed program must take into account, when possible, unintended effects. To do otherwise would be to leave unexamined certain critical information about the overall impact of a program on the safety of the users of California's roads. Any proposed change to DUI sanctions may have an associated effect on crashes—even where that associated effect was unintended. Because alcohol and drug impairment plays an important role (often causal) in a substantial proportion of fatal/injury crashes in California, it is therefore vital to understand, to the extent possible, both the intended and unintended effects that proposed changes to DUI sanctions may have on crash outcomes.

As detailed above, the provisions of AB 91 are similar to other IID programs in the U.S. Namely, in contrast to other existing (and also previously described) statewide implemented IID programs in California, this pilot program (1) is mandatory rather than optional; (2) is administered by the California DMV rather than by courts; (3) in addition to repeat DUI offenders, also includes first DUI offenders; and, finally, (4) uses an IID installation for a pre-specified time period as a condition for full license reinstatement.

Because the implications of the AB 91 pilot program are distinctly different, more inclusive, and more consequential than the implications of other currently-existing IID programs in the state, it is necessary to determine if this program is associated with differences in DUI recidivism and crashes between DUI offenders in the pilot counties who were subject to and complied with the IID pilot program requirements and those who were not subject to the pilot program. Since the unit of the analyses for this evaluation is at the individual driver level, a sufficient follow-up time was required to capture subsequent DUI convictions, DUI-related incidents, and crash involvement information for different groups of DUI offenders, before this evaluation could be conducted. A discussion of the two types of evaluations conducted separately for each of the three different DUI offender groups (first, second, and third and subsequent) is presented in the following paragraphs.

AB 91 Intent-To-Treat Evaluation

The AB 91 intent-to-treat evaluation was conducted separately for each of three DUI offender groups (first, second, and third and subsequent) by way of comparing subsequent DUI recidivism and crash involvement of DUI offenders in the AB 91 pilot counties with the same type of offenders in non-pilot counties. These types of evaluations are characterized as "intent to treat" evaluations because they include all DUI offenders who were subject to the AB 91 law *regardless of whether or not they complied with the law*. As demonstrated in prior research

studies, this type of analytical approach that includes all DUI offenders from the pilot counties, the ones that complied and those who failed to comply with the program requirements, is crucial to fully understand the effectiveness of all components of the pilot program. Namely, the offenders who did not comply with the pilot program are a part of a complete picture of the pilot program and should not be excluded from the intent-to-treat evaluation. As discussed in the following sections of the report, the comparison groups of like DUI offender groups from non AB 91 pilot counties consisted of drivers who either complied or did not comply with their DUI-related sanctions and/or license restriction/reinstatement requirements.

AB 91 IID/Restricted License Evaluation

As with the previous type of evaluation approach, the AB 91 IID/restricted license evaluation was completed separately for first, second, and third and subsequent DUI offenders. The focus of the AB 91/IID-restricted license evaluation involved a comparison of subsequent DUI recidivism and crash involvement of DUI offenders from the AB 91 pilot counties who complied with all pilot program requirements and obtained an IID-restricted license with an eligible comparison group of similar DUI offenders who did not obtain an IID-restricted license. That is, the comparison group consisted of offenders who remained on a suspended or revoked driver license during the study time period. The AB 91 IID/restricted license evaluation allowed for comparisons between DUI offenders with IID-restricted licenses under the AB 91 law and those with suspended/revoked driver license during the same time period. Since licensing sanctions are one of the most proven-effective DUI countermeasures, it was important to understand outcomes associated with the AB 91 pilot program in the context of these existing DUI countermeasures.

METHOD

The methodology adopted for the present study is heavily patterned on that used by DeYoung et al. (2005) in their benchmark evaluation of the effectiveness of ignition interlock laws in California. Some methodological details are reserved for the Results section because they are more understandable within the context of the study findings.

Subject Selection

Data on all drivers convicted of a DUI offense (CVC 23152) with violation dates from July 1, 2010 through June 30, 2013 were obtained from abstracts of conviction, which are reported to DMV by all California courts and stored on the Department's Driver Record Master (DRM) database. Data were extracted in January 2015, which allowed enough follow-up time to conduct separate outcome analyses for the three DUI offender groups (defined in detail in the following paragraph).

For all DUI offenders selected for the study, DUI offender level was used to differentiate between first, second, and third and subsequent DUI offenders. As defined under CVC Sections 23536 – 23568, drivers who did not have a conviction considered as a prior for DUI within 10 years from the violation date of their current DUI conviction were categorized as first DUI offenders. Drivers convicted of a DUI with one conviction considered as a prior for a DUI (according to the same CVC Sections mentioned above), within 10 years from the violation date of their current DUI conviction, were identified as second DUI offenders. Finally, drivers convicted of a DUI with two or more convictions considered as prior for DUI, within 10 years from the violation date of their current DUI conviction, were identified as third and subsequent DUI offenders.

Separate outcome analyses were conducted for each DUI offender group due to considerable differences in the respective post-conviction licensing sanctions and associated requirements to obtain a restricted license and/or to reinstate a driving privilege. These differences exist both in the statewide provisions regulating DUI and in the AB 91 requirements within the pilot counties. Specific details pertaining to the statewide post-conviction licensing sanctions and to requirements for a restricted and/or reinstated driving privilege, relative to a particular DUI offense and DUI offender level, are described in CVC 13352 – 13352.5. Further, the AB 91 pilot program components are specified in CVC 23700. Some of these provisions are described in the

following paragraphs, specifically those that necessitated a need to separate all study subjects into three distinct DUI offender groups and thus to conduct separate outcome analyses for each group.

Upon a first conviction of CVC Section 23152, a person is subject to a license suspension for a period of 6 months. According to the AB 91 pilot program requirements, first DUI offenders whose conviction under CVC 23152 occurred in one of the AB 91 pilot counties must install an IID device in all vehicles they own or operate for a period of 5 months.

Second DUI offenders convicted of CVC 23152 are subject to license suspension for 2 years. The AB 91 pilot program requires these offenders from the pilot counties to drive a vehicle equipped with IID for a period of 12 months upon conviction of the same CVC Section.

Finally, third and subsequent DUI offenders convicted of CVC 23152 are subject to a license revocation for a period from 3 to 4 years. Under the AB 91 pilot program, those whose DUI offense occurred in one of the pilot counties are required to operate a vehicle equipped with an IID for a mandatory period ranging from 2 to 3 years.

In addition, all repeat DUI offenders (second and subsequent) must complete an initial 12 months of the suspension/revocation period before they can apply for an IID-restricted driving privilege. Furthermore, under provisions of SB 598 and as described in the Introduction section, second and third offenders convicted of CVC 23152, when alcohol-only (as opposed to drugs) was involved, may obtain an IID-restricted driver license after completing a shorter initial suspension/revocation period. Specifically, second offenders under SB 598 can apply for a restricted license after 90 days, and third offenders after 6 months, of the original post-conviction suspension/revocation period.

The IID installation requirement for a pre-defined time period is just one of the requirements which DUI offenders in the AB 91 pilot counties have to comply with in order to obtain either a restricted driver license or to reinstate their driving privilege. Among other conditions are the following: (1) DUI treatment program enrollment or completion depending on DUI offender status, (2) proof of financial responsibility, and (3) paying various restriction or reissue fees. However, the IID installation requirement is **not** a mandatory requirement for license reinstatement in other currently-existing statewide IID programs (e.g., SB 598).

Therefore, based on above-mentioned conditions pertaining to different DUI offender groups, the follow-up period for each DUI offender group in this study was selected to coincide with post-conviction licensing sanctions and the AB 91 pilot program requirements discussed above. Specifically, the post-conviction follow up periods for all analyses presented in the following sections were for a maximum of 12 months for the first DUI offender group, 30 months for the second DUI offender group, and 42 months for the third and subsequent DUI offender group.

The driver records were also screened to identify and exclude from the evaluation any drivers who did not meet specified subject-selection criteria in order to eliminate any confounding or misleading results. The excluded cases consisted of the following:

- Deceased drivers;
- Drivers residing outside of California;
- Drivers who were never licensed to drive in California;
- Commercial drivers; and
- Drivers convicted of causing bodily injury and/or harm while under the influence of alcohol/dugs under CVC section 23153.[1]

Study Enhancements

Before proceeding with a discussion of the present study's evaluations, it is important to present the reader with three major enhancements of the current study relative to the previously published general deterrence evaluation (Chapman et al., 2015). These enhancements are primarily related to the type of data analyzed in the present study. The 2015 DMV evaluation (as legislatively required by the specific language in AB 91) analyzed data at the aggregated county level and examined changes in the rates of DUI and combined DUI/alcohol- or drug-reckless convictions in the four AB 91 pilot counties. The present evaluation, however, was based on individual level data and compared driver records of DUI offenders from both the AB 91 pilot and non-pilot counties. This approach was essential to determine if there were individual driver-level differences in DUI recidivism and crashes between DUI offenders in the pilot counties (who were subject to and complied with the AB 91 pilot program) and those who were not

[1] Commercial drivers and drivers convicted of CVC 23153 were excluded from the study because their license control penalties and restriction/reinstatement requirements are substantially different from the majority of drivers convicted of an alcohol/drug offense (CVC 23152). The interested reader is referred to the California vehicle code for further information on sanctions applying to commercial drivers and/or to drivers convicted of CVC 23153.

subject to AB 91 provisions (i.e., not convicted in a pilot county). Data analyzed at the individual level, as opposed to aggregate data, generally result in more sensitive analyses in that reliable differences are more likely to be detected when they exist.

The first enhancement involved the application of a propensity score matching technique to statistically control for differences between treatment (AB 91 pilot county DUI offenders) and comparison (DUI offenders from non-pilot counties) groups. This enhancement was used because it was not possible to randomly assign DUI offenders to the two intervention groups. Such techniques (described in detail below) allowed for the formation of individual-level treatment and comparison groups consisting of like drivers. For example, a driver who was convicted of a DUI in an AB 91 pilot county was matched to a similar driver convicted of a DUI in a non-AB 91 pilot county, thereby equating them on preexisting characteristics (prior driving history information and demographic differences). These matching techniques were critical in removing preexisting biases to the extent possible that may not be attainable when analyzing aggregate-level data.

A second enhancement allowed the use of specific statistical techniques (discussed below) to measure and detect individual differences between AB 91 pilot and non-pilot subjects over the time periods containing potential treatment-specific critical events. These events included those such as the primary outcome events of interest (i.e., crashes and DUI convictions), DUI related licensing action, and installation/removal of the IID.

A third enhancement relates to the temporality of the current study's analyses. That is, the 2015 report was legislatively mandated and, therefore, had to be completed before adequate post-conviction criterion data could be processed by courts and law enforcement agencies and updated to the department's DRM. With the passage of time associated with the current study, additional post-conviction and crash-involvement driver record data were available and employed for the individual level analyses. This allowed for the incorporation of crash and conviction data that had not been updated on the Department's database for use in the 2014 evaluation.

Study Evaluations

Two evaluations for each DUI offender group were conducted. Specifically, the evaluations can be conceived as (1) an overall AB 91 intent-to-treat evaluation and (2) an AB 91 IID/restricted license evaluation. These two evaluations are described in detail below.

AB 91 intent-to-treat evaluation. As detailed in the Introduction section above, the intent-to-treat evaluation conducted in the present study is an extension of the 2015 DMV general deterrence evaluation that assessed the impact of implementing the AB 91 pilot program in Alameda, Los Angeles, Sacramento, and Tulare Counties (Chapman et al., 2015).

The intent-to-treat evaluation in the present study addressed a similar question to the one in the 2015 report. That is, the current evaluation addressed the question as to whether the AB 91 pilot program in its entirety is associated with a positive or negative traffic safety impact as compared to other existing statewide treatment/intervention modalities (e.g., license suspension/revocation, other IID and license restriction programs) targeting specific DUI offender groups.

To conduct the current AB 91 intent-to-treat evaluation, one group of drivers who were not excluded were subjects whose driver record indicated that they did not comply with the AB 91 pilot program restriction/reinstatement requirements by satisfying, among other conditions, installation for a predefined time period of an IID device in the vehicle(s) they operate. In an intent-to-treat evaluation, it is important to include such drivers because they represent part of the overall effect of the program, as pointed out by DeYoung et al. (2005). Consequently, all DUI offenders that are subject to the specific requirements of the AB 91 pilot program, regardless of whether they complied or chose not to comply with the program requirements, were included in the AB 91 intent-to-treat evaluation in order to provide a complete assessment of the positive and/or negative traffic safety impacts associated with this particular program.

After identifying AB 91 eligible drivers (i.e., those convicted of a DUI offense in the four pilot counties during the pilot program implementation period), it was important to identify and select a comparison group of drivers. This pool of comparison drivers consisted of those who were convicted of a first, second, or third and subsequent DUI offense in one of the non-pilot counties during the AB 91 pilot program implementation period. As with the AB 91 subjects, this comparison group of subjects also consisted of those who complied or who failed to comply with their DUI related sanctions and license restriction/reinstatement requirements. The comparison group was identified by using DUI conviction information provided by California courts and recorded on the Department's DRM.

AB 91 IID/restricted license evaluation. While the AB 91 intent-to-treat evaluation described above evaluates the AB 91 program as implemented (and as intended), the evaluation of the AB 91 IID/restricted license is fundamentally different. That is, the AB 91 IID/restricted license evaluation can be viewed as an examination of the efficacy of IID devices as part of the AB 91

pilot program restriction/reinstatement requirements. The evaluation detailed in this section addresses the potential effectiveness of the IID devices themselves, as prescribed under the AB 91 law. This is of importance because although the AB 91 program in its entirety may not be effective, the IID devices and the associated IID-restricted license may or may not be effective in reducing DUI recidivism during or after the IID installation period among DUI offenders that complied with the AB 91 pilot program requirements. If such a situation exists, consideration should be given to revise the components of AB 91 pilot program to more effectively utilize the IID and associated restricted/reinstated license requirements. However, if the IID installation as part of the AB 91 program provisions for a restricted/reinstated driver license is shown to be associated with a negative traffic safety impact (i.e., increased crashes and/or increased convictions), there would be no empirical justification for continuing the AB 91 pilot program or for expanding it more broadly.

To conduct the AB 91 IID/restricted license evaluation, the Department's DRM was used to identify drivers with a qualifying DUI offense in one of the AB 91 pilot counties who installed an IID and satisfied other requirements to receive the AB 91 IID-restricted license. Comparison group drivers for this evaluation consisted of drivers convicted of the same offense (CVC 23152), who remained suspended or revoked following their qualifying DUI conviction and, therefore, did not receive a restricted driver license.

Research Design

The research design used in the present study for both types of evaluations focuses on answering questions about the effectiveness of the AB 91 ignition interlock pilot program in California. In both evaluations, the design compares the post-conviction odds or hazards of a subsequent DUI conviction, DUI incident, and crash between treatment and comparison groups, as specified above for each evaluation. The rationale for this research design is that, all other things being equal, if the AB 91 pilot program is an effective traffic safety countermeasure, the outcome will be reflected in a lower risk of subsequent driver record entries of the treated drivers relative to comparison group drivers. As described in detail by DeYoung et al. (2005) and paraphrased in the following discussion, the key to such a design is *all other things being equal*.

If all other things are *not* equal, then there can be other, extraneous factors, that can account for and influence differences in subsequent driving behavior between the AB 91 treated drivers and the comparison drivers, in addition to the effect of the AB 91 treatment. For example, if AB 91 treated DUI offenders have worse prior driving records than DUI offenders in the comparison

group, one would expect that these AB 91 treated DUI offenders would have worse subsequent records of DUI convictions and crashes, apart from any AB 91 treatment (i.e., an IID-restricted license) that they received. In other words, preexisting characteristics or differences between groups could bias the results and, therefore, render the study finding ambiguous and/or misleading.

As noted in such classic research design texts such as Kirk (1968) and Campbell and Stanley (1963), the gold standard in evaluation research is to randomly assign subjects to the groups being compared to insure that extraneous factors are spread evenly among the groups. Unfortunately, random assignment was not possible in the present study. Rather, drivers in the present study residing in the AB 91 counties "choose" (either intentionally or unintentionally) whether to fulfill the requirements to obtain a restricted license. This "self-selection" bias could influence the magnitude and direction of the study results.

Consistent with the DeYoung et al. (2005) study, statistical controls were employed to attenuate as much of this potential preexisting group bias as possible. These statistical controls occurred at two levels. The first was to match comparison drivers with treated AB 91 drivers on selected variables. The second was to remove as much remaining bias as possible during the analyses by using covariates in the final statistical models. This section of the report will present a discussion of the matching process; the discussion of the use of the covariates will be reserved for the analysis section of the report.

Comparison drivers for the study's two evaluations were matched to treated drivers through the use of propensity scores, following the work of Rosenbaum and Rubin (1985).[2] Propensity scores can be thought of as predicted values, and, as used here, they reflect the probability that a driver was in an AB 91 treatment group. Propensity scores were calculated for all drivers in the AB 91 pilot and non-pilot counties in California by using SAS PROC LOGISTIC to perform a multiple logistic regression analysis that incorporated demographic and prior driving record variables as predictors in the model.[3]

After the propensity scores were computed for all drivers, the next step was to match control drivers to the treated drivers. SAS software programs were written to perform the matching for

[2] For this study, a greedy match algorithm initially developed by Lori Parsons as presented by Friedman and Thurman (2012) was used.
[3] For a detailed discussion of logistic regression, the interested reader is referred to Hosmer and Lemeshow (1999).

both the AB 91 intent-to-treat and AB 91 IID/restricted license evaluations.[4] For each evaluation, the SAS program compared the propensity scores for each comparison driver from the pool of such drivers to the score of the selected AB 91 treatment group driver. The SAS program then selected the control driver with the closest propensity score to include in the final sample of comparison drivers. In this way, the comparison drivers selected for the final AB 91 intent-to-treat evaluation and AB 91 IID/restricted license evaluation samples were as similar as possible to the treatment group drivers on those variables used to form the propensity scores. This technique resulted in a reduction in the potential preexisting group differences that could potentially bias the study results. The final sample sizes and average propensity scores for all groups used in the subsequent analyses are presented in Table 1.

The appropriate comparisons in Table 1 involve a DUI offender group **within** the specific evaluation type. For example, an examination of the mean propensity scores for the first offender AB 91 intent-to-treat evaluation shows nearly identical scores for both the 60,091 treatment and 60,091 comparison group subjects (0.269718 and 0.269714, respectively). This implies that the two groups are equated on potentially biasing factors (within five significant digits) and can be compared on the outcome measures. The reader will note from the table that the values **within** each DUI offender group are approximately equal for each evaluation type, indicating that the matching algorithm was successful in producing balanced study groups to be used in the subsequent analyses.[5]

To formally test the success of the matching process, a multiple logistic regression was conducted for each DUI offender group within each evaluation type. The results yielded no statistically significant (reliable) post-match treatment/comparison group discrimination on the variables used to construct the propensity score matched samples.[6] For demonstration purposes, the interested reader is referred to Appendix Table C for the post matching descriptive statistics associated with four variables used to compute the propensity scores.

[4] For a detailed discussion of the use of SAS and its application to the propensity score models used for the present study, the interested reader is referred to Friedman and Thurman (2012).
[5] See Appendix D which lists the variables assessed for the propensity score model.
[6] A test of statistical significance allows one to determine the probability that an observed difference is due to chance alone. If this probability is sufficiently small, it is concluded that the difference is "real" and/or reliable. Unless otherwise stated, a difference in the present study was considered to be statistically significant when the probability of a difference that large or larger (in either direction) occurring by chance was less than 1 in 20 ($p<.05$).

Table 1

Mean Propensity Scores and Sample Sizes for Study Groups

Study group	AB 91 intent-to-treat evaluation		AB 91 IID/restricted license evaluation	
	Mean propensity score	Sample size	Mean propensity score	Sample size
First DUI offender				
Treatment	0.269718	60,091	0.210829	27,295
Comparison	0.269714	60,091	0.210825	27,295
Second DUI offender				
Treatment	0.314026	18,142	0.135989	7,315
Comparison	0.313996	18,142	0.135982	7,315
Third and subsequent DUI offender				
Treatment	0.267828	5,357	0.066896	1,100
Comparison	0.267793	5,357	0.066894	1,100

It is important to acknowledge that while the use of propensity score matching and covariates in statistical modeling are critical in reducing bias, such techniques cannot eliminate all potential bias as it is impossible to know all of the multivariate dimensions (measured and unmeasured) on which treatment and comparison groups differ that might affect the study results. As a result, the analyses presented in this study should be viewed as depicting statistically significant relationships between AB 91 pilot program interventions and subsequent traffic safety indices as opposed to providing definitive cause and effect evidence of AB 91 program interventions.

Analysis

Before producing the final statistical models for each evaluation, descriptive statistics were computed for all of the study variables in order to check for outliers, missing data, and potential multicollinearity issues. Means and variances were calculated for all covariates and outcome measures. Group means and variances were also calculated and compared between all study groups.[7]

[7] The interested reader is referred to Tabachnick and Fidell (2001) for the techniques and protocol for data screening and for assessing potential problems with the data by examining indices such as measures of central tendency, dispersion, etc.

The same analytical procedures were used for both the AB 91 program and AB 91 IID/restricted license evaluations. For each evaluation, statistical models were developed separately for three outcome (criterion) measures: (1) days to first subsequent DUI conviction, (2) days to first subsequent DUI incident (i.e., APS suspension, alcohol- or drug-involved crash, DUI conviction, or DUI Failure-to-Appear violation), and (3) days to first subsequent crash (i.e., any traffic crash—property damage and/or injury/fatal reported to the Department by law enforcement or involved drivers). Cox regression, a particular form of survival analysis, was used to analyze these three measures.[8]

Cox regression is one of the most appropriate and powerful methods for evaluating potential program effects when (as was the case with the present study) the interest is time to a first event such as a crash and conviction and when study subjects have differing amounts of time in a study and are subject to censoring (lost to follow-up). In addition, the technique is desirable because it can eliminate the effects of higher-level interventions that occur, for example, when a first DUI offender accumulates a second DUI offense and becomes eligible for sanctions associated with a second or subsequent DUI conviction. For example, since the effects associated with a second DUI conviction are present in the raw data for the first DUI conviction intervention group, it was important to use a statistical technique to eliminate these effects and make it possible to estimate the separate AB 91 treatment intervention impact within each DUI offender group.[9]

Another important aspect of Cox regression is that covariates can be used in the model. In the Cox models constructed for the present study, demographic and prior driving indices were included as covariates to assist in bias control. These covariates were entered in a hierarchical fashion. That is, the covariates were entered first in the Cox model, and group (i.e., treatment versus comparison) was entered after the covariates, which allowed assessing whether AB 91 treatment affected a particular traffic safety outcome after controlling for the covariates.

Specifically, the initial step of the statistical modeling for the criteria measures associated with each evaluation was to select potential covariates to use in the model. This was accomplished by first examining, for each potential covariate, its simple correlations with the treatment group

[8] For a detailed presentation of Cox regression analysis, the interested reader is referred to Hosmer and Lemeshow (1999) and Allison (1995).

[9] The authors would like to note that although Cox regression is a very powerful statistical technique for the reasons cited, it does have its shortcomings. For example, since there is no intercept term, the equation cannot be used to predict survival time. Additionally, the Cox model does not provide individual estimates of group-specific hazard rates. This may be important in studies where the absolute differences are as important as the relative differences. For example, a hazard ratio of 2 may have much more "clinical" significance if the hazard rates were .50 and .25 rather than .02 and .01.

variable and with the outcome measure. The variable was selected as a potential covariate if its relationship with both measures was statistically significant. The next step involved using SAS PROC PHREG to run a backward elimination Cox regression analysis by using all potential covariates identified in the first step as predictors and the specific outcome measure (e.g., days to first subsequent crash) of interest as the outcome or criterion measure. Covariates found to be significant in the selection models were retained for use in the final treatment/outcome Cox regression equations.

Following covariate selection, SAS PROC LIFETEST was used to produce Kaplan-Meier estimates of the sample (no covariates) survivor, log negative log survivor, and hazard plots. These plots were used to assess the raw survivor and hazard functions for the AB 91 treatment and comparison groups not adjusted for covariates. These plots illustrated information on the groups' survival over time in addition to the specific times at which they were at a particular risk of recidivating (i.e., risk for a subsequent DUI incident or crash). The plots were also used to determine if the hazards of the groups were proportional over time, a fundamental statistical assumption associated with Cox regression in order to correctly interpret the parameter estimates and odds/hazard ratios associated with the relationship between the outcome measures and treatment.

A final statistical test of the proportional hazards assumption was performed by using SAS PROC PHREG to run Cox regression models that included the time (e.g., days to first crash) by covariate and the group by time interactions. As demonstrated by Hosmer and Lemeshow (1999) and Allison (1995), a violation of the proportional hazards assumption is not "fatal" to the analyses, but simply represents one of several possible model misspecifications appropriately handled by modeling the hazard ratios of the significant interactions in the final model.

Following completion of the preliminary steps described above, the final Cox survival regression models were developed for each outcome assessed in both the AB 91 intent-to-treat and AB 91 IID/restricted license evaluations. Following the protocol for hierarchically well-formulated statistical models, the final models included all of the covariates (if any were statistically identified as necessary), entered as a block, followed by any covariate by time interactions, the treatment group, and any treatment group by time interactions. This was done to assess the relationship between AB 91 treatment and the three outcome measures (i.e., DUI convictions, DUI incidents, and crashes) after adjusting for the covariates.

In the Cox survival regression technique, the hazard ratio is a primary index (as opposed to means and mean differences in count regression models) of describing the relationship between the criterion or outcome measure and the treatment effect. As discussed in Tabachnick and Fidell (2001), the hazard ratio is interpreted as an odds ratio comparing the odds of an outcome in one group to the odds of the outcome in a comparison group over the time period of the study. These odds are computed from the regression coefficient or parameter estimate (B) as e^B. A positive regression coefficient leads to an odds or hazards ratio greater than one while a negative coefficient leads to an odds or hazards ratio less than one. For example, assume one observes a hypothetical negative regression coefficient associated with treatment of -0.2300 for the crash criterion. The negative sign of the coefficient would indicate that treatment group drivers are less likely to be crashed involved relative to comparison group drivers over the course of the study period.[10] Recall that $e^{-0.2300} = 0.79$; this indicates that the odds or hazards of crashing are decreased by about 21% [(1-.79)*100] for treatment group drivers relative to comparison group drivers over the course of the study. Unless otherwise stated, the statistical reliability of an AB 91 treatment effect hazard ratio (either positive or negative) was assessed by a chi-square significant at $p = .05$. Where appropriate, fitted survivor graphs were produced to provide a visual representation of the effects of AB 91 treatment on the criterion measure while controlling for any relevant covariates.

[10] This example assumes that the treatment group is coded 1 and the comparison group is coded 0.

RESULTS

AB 91 Intent-To-Treat Evaluation

Before proceeding with the results, it is important to note that prior to modeling the final equations for each evaluation, DUI offender group, and outcome criterion, two critical analytical steps were conducted. The first step for each analysis was to examine the simple bivariate correlations and the results from an initial Cox regression model involving the treatment/comparison group drivers from Table 1 for all variables assessed in the computation of the propensity score. This was done in order to identify and select covariates, if needed, to further reduce any remaining bias between the treatment and comparison groups following the propensity score matching process. Any covariate that met the required level ($p \leq .05$) of statistical significance was retained for inclusion as a covariate in the final model. The covariate selection process will be described in detail only as needed in the following sections.[11]

The second step involved procedures used to check the adequacy of one of the main assumptions underlying the Cox regression model, that is, the proportional hazards assumption. This assumption requires that the hazard rates for the levels or groups defined by each predictor variable retained in the final model are proportional over time. This assumption was examined initially by creating difference plots of the log negative log function for each level of a predictor variable (Allison, 1995; Hosmer & Lemeshow, 1999). SAS PROC LIFETEST was used to produce sample survivor and hazard plots. These provided pictorial guidance as to the form of any potential non-proportionality. The definitive and final test for assessing the proportional hazards assumption was to create interaction terms for each predictor/covariate by time in a Cox regression model to determine whether the interaction was statistically significant ($p \leq .05$). Unless described in detail in the following sections, the reader can assume that the proportional hazards assumption was met and that the Cox regression model was appropriately applied. In situations in which the assumption was violated, the alternative analytical technique (the extended Cox regression model which is described in detail) was used.[12]

[11] The interested reader is referred to Friedman and Thurman (2012) for a discussion of the biases that can be created if this step is omitted from analyses using propensity score matched samples.

[12] The interested reader is referred to Ata and Sozer (2007) and to Patetta (2006) for discussions of potential misinterpretations and erroneous conclusions that can arise out of applying a proportional hazards model when the hazards are, in fact, non-proportional.

First DUI Offenders

The first DUI offender AB 91 intent-to-treat evaluation assessed the association between the matched sample of 60,091 treatment group drivers and the 60,091 comparison group drivers identified in Table 1 on the three criteria measures described below. As stated in the Method section, the time period used for first DUI offenders was the subsequent 12 months. This time period was chosen to coincide with the post-conviction sanctions and IID/restricted license requirements associated with first DUI offenders.

Days to first subsequent DUI conviction. The initial analyses identified prior 3-year major convictions as the covariate and indicated that the proportional hazards assumption was not violated for the days to first subsequent DUI conviction.[13]

SAS PROC PHREG was used to fit the final Cox proportional hazards survival regression model for days to first subsequent DUI conviction. The final model consisted of prior 3-year major convictions and the treatment group variables as the predictors. The results are displayed in Table 2.

Table 2

First DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent DUI Conviction

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year major convictions	0.4545	24.5995	< .0001	1.575
Treatment/control	0.0448	1.7883	.1811	1.046

Note. Likelihood Ratio Chi Square = 21.8072, *p* value < .0001

Although the prior 3-year major convictions covariate is statistically significant, the term of primary interest—treatment group—is clearly not statistically significant with a *p* value equal to .18.[14] Therefore, this analysis shows that there is no reliable difference in the number of days to

[13] Major convictions are associated with serious violations such as DUI, reckless driving, hit-and-run – most of which are alcohol/drug related. A major conviction results in two negligent operator points being charged to the individual's driver record. The interested reader is referred to Gebers and Roberts (2004) for the details associated with California's Negligent Operator Treatment System.

[14]Once it is established that the test result is not statistically significant/reliable, the point estimate (here the hazard ratio of 1.046) presents non-substantive information reflecting sampling error and, therefore, is not a subject for further elaboration. For this type of statistical analysis, in the case of a non-significant test result, the confidence

first subsequent DUI conviction between first DUI offenders in the AB 91 pilot counties and those in non-pilot counties. In other words, the AB 91 program is not associated with an increase or decrease in the odds or hazards of a subsequent DUI conviction among first DUI offenders over the 12-month time period. This finding is illustrated in Figure 1.

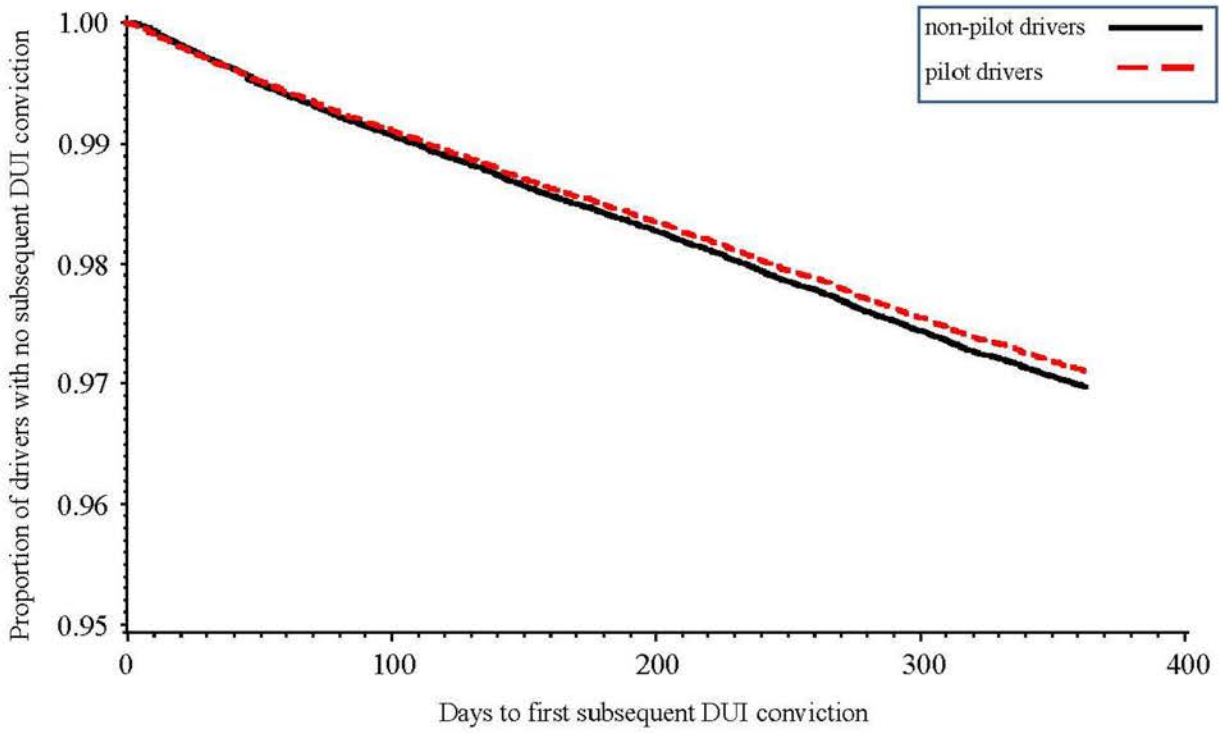

Figure 1. Final survival model: Number of days to first subsequent DUI conviction for first DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

Figure 1 displays the proportion of AB 91 pilot (treatment) and non-pilot (comparison) groups surviving (i.e., that do not have a subsequent DUI conviction) during the 12-month follow-up period from the original DUI conviction utilized for first DUI offenders. The reader will note that as with all figures subsequently presented in this report, a higher line for a group represents a lower odds or hazards of outcome (here DUI convictions). The most prominent feature of Figure 1 is that the survival rates for the two groups are very close together. This visually confirms the result from the statistical analysis presented in Table 2 that there is no reliable difference between first DUI offenders from the pilot counties (treatment group) and first DUI offenders from non-pilot counties (comparison group) in their number of days to first subsequent DUI conviction.

interval contains 1.0, indicating no difference between the groups. For a discussion of statistical testing using *p* values and confidence intervals, the interested reader is referred to a classical text such as Kirk (1968).

Days to first subsequent DUI incident. The initial analyses indicated prior 3-year major convictions was to be retained as a covariate in the final model and that the proportional hazards assumption was met for use of the Cox proportional hazards regression.

SAS PROC PHREG was used to perform the final Cox regression modeling for days to first subsequent DUI incident criterion measure. This final model first fit the prior 3-year major convictions covariate and then assessed the statistical significance of the AB 91 intent-to-treat evaluation treatment group variable after adjusting for the covariate. The results of the analysis are presented in Table 3.

Table 3

First DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent DUI Incident

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year major convictions	0.5754	61.5071	< .0001	1.778
Treatment/control	-0.0186	0.4047	.5247	0.982

Note. Likelihood Ratio Chi Square = 48.5509, *p* value < .0001

While the prior 3-year major conviction covariate is statistically significant ($p < .0001$), the treatment variable with a p value of .52 is clearly not. This indicates that there is no reliable difference between the first DUI offenders in the pilot counties (treatment group) and those in the non-pilot counties (comparison group) in their number of days to first subsequent DUI incident. Therefore, there is no evidence that the AB 91 program is associated with a reduction or increase in the odds or hazards of a subsequent DUI incident over the 12-month time period. These results are pictorially presented in Figure 2.

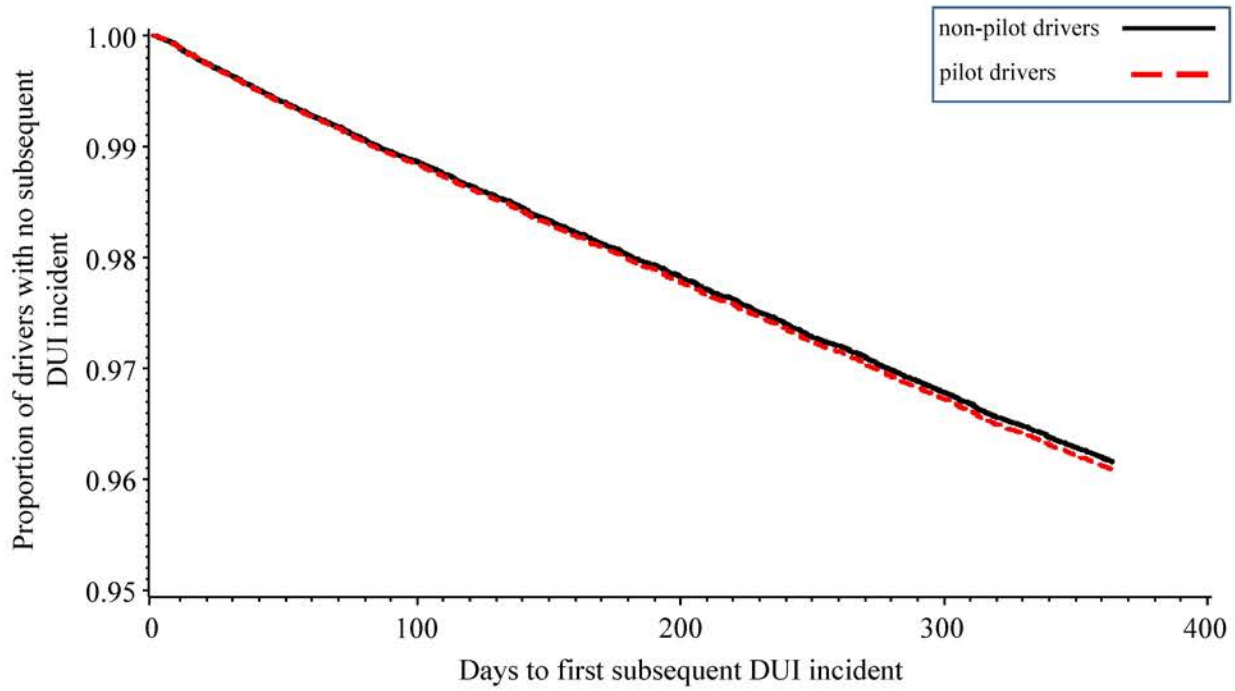

Figure 2. Final survival model: Number of days to first subsequent DUI incident for first DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

Figure 2 illustrates the survival rates for the AB 91 intent-to-treat evaluation treatment and comparison groups. The figure clearly shows that the survival rates of the two groups on the days to first subsequent DUI incident are very similar. In fact, the lines are so close together at the majority of points that the survival rates are virtually indistinguishable. This confirms the results from Table 3 in that there is no statistically significant difference in days to first subsequent DUI incident between the AB 91 intent-to-treat evaluation first DUI offender treatment and comparison groups.

<u>*Days to first subsequent crash*</u>. Initial analyses indicated that the count of prior 3-year fatal/injury crashes was to be retained as a covariate in the final model and that the proportional hazards assumption was met.[15]

[15] The number of fatal/injury crashes is a count of crashes in which one or more persons were injured or killed. The occurrence of fatalities/injuries is recorded for only police-reported crashes. Presumably, almost all fatal crashes and a high percentage of injury crashes are investigated by law enforcement and are recorded on the DRM.

SAS PROC PHREG was used to produce the final Cox regression model. This model included the prior 3-year fatal/injury crashes covariate and the AB 91 intent-to-treat evaluation first DUI offender group treatment variable as predictors of the days to first subsequent crash outcome measure. The results are displayed in Table 4.

Table 4

First DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent Crash

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year fatal/injury crashes	0.0860	3.9144	.0479	1.090
Treatment/control	-0.0625	4.0063	.0453	0.939

Note. Likelihood Ratio Chi Square = 7.8685, *p* value = 0.0196

The reader will note from Table 4 that both of the predictors are statistically significant ($p \leq .05$). The treatment group effect is of particular importance. As displayed in Table 4, the treatment group is marginally statistically significant with a *p* value of .0453. For this analysis, the dichotomous treatment variable was coded AB 91 pilot treatment subject = 0 and comparison subject = 1. Therefore, the negative parameter estimate and associated hazard ratio < 1.0 indicate that the hazard or odds of a subsequent motor vehicle traffic crash is **less** for the **comparison** group. That is, the first DUI offenders from non-pilot counties (comparison group) have a significantly lower subsequent hazard or odds of a subsequent crash relative to the first DUI offenders from the AB 91 pilot counties (treatment group) by approximately 6.1% [(1-.939)*100]. This is visually demonstrated in Figure 3.[16]

[16] To explore the possibility of a crash-reporting bias affecting the results, the proportion of subsequent fatal/injury crashes to subsequent total crashes was calculated for each treatment/comparison group within both the AB 91 intent-to-treat evaluation and AB 91 IID/restricted license evaluation samples. The number of casualty crashes forms a relatively "clean" measure because these crashes are usually much less subject to non-reporting than are property-damage-only crashes. If a reporting bias were present, one would expect the artifact to result in a sizable proportional difference between the two groups. However, the proportion of fatal/injury crashes to the total reported crashes did not significantly ($p > .05$) differ between any treatment/comparison group within this study's AB 91 program or IID/restricted license evaluations.

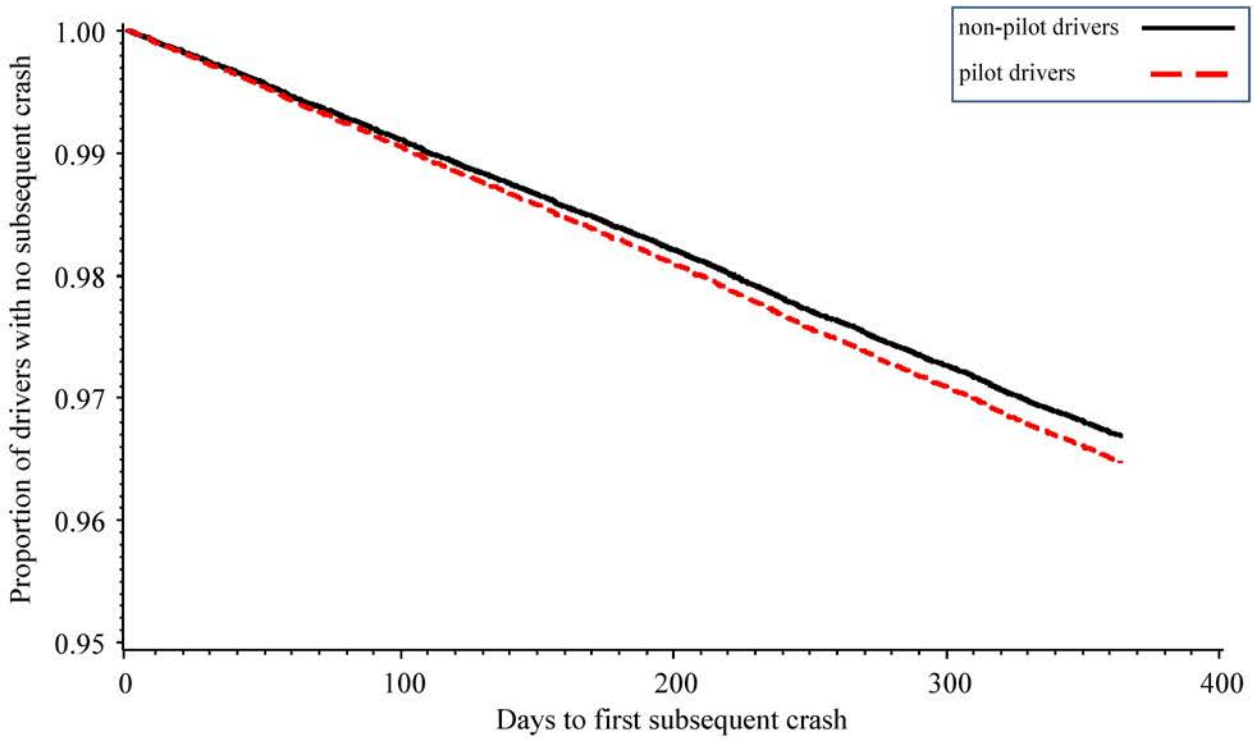

Figure 3. Final survival model: Number of days to first subsequent crash for first DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

Figure 3 confirms the findings from the statistical analysis shown in Table 4 in that the comparison group's survival curve is higher than that associated with the treatment group. That is, the AB 91 intent-to-treat evaluation results suggest that first DUI offenders from non-pilot counties (comparison group) survive longer without a subsequent traffic crash relative to those from the AB 91 pilot counties (treatment group).

Therefore, the analyses associated with the AB 91 intent-to-treat evaluation for first DUI offenders show a lower hazards or odds of a subsequent crash over the 12-month period for the offenders in non-pilot counties relative to those in the pilot counties, even though there does not seem to be an association with the hazards or odds of a subsequent DUI conviction or DUI incident during the same time period.

Second DUI Offenders

The second DUI offender AB 91 intent-to-treat evaluation assessed the association between the matched sample of 18,142 treatment group drivers and the 18,142 comparison group drivers

identified in Table 1 on the three criteria measures described below. As stated in the Method section, the time period used for second DUI offenders was the subsequent 30 months from the qualifying DUI conviction. This time period was chosen to coincide with the post-conviction sanctions and IID/restricted license requirements associated with second DUI offenders.

Days to first subsequent DUI conviction. The initial analyses indicated that it was necessary to include prior 3-year major convictions as a covariate in the final analysis and that the proportional hazards assumption was met.

The final Cox regression model included the prior 3-year major convictions covariate and the AB 91 intent-to-treat evaluation treatment group variable, whose relationship with subsequent DUI convictions was adjusted for the relationship with the covariate. The results are presented in Table 5.

Table 5

Second DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent DUI Conviction

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year major convictions	0.3189	69.3462	< .0001	1.376
Treatment/control	-0.1140	7.6042	.0058	0.892

Note. Likelihood Ratio Chi Square = 75.2637, *p* value < .0001

As displayed in the table, both predictors in the model are statistically significant. The statistical significance of the prior 3-year major convictions variable indicates that any preexisting differences on this dimension between the treatment and the comparison groups, that were still present subsequent to the propensity score matching, have been reduced. More importantly, the AB 91 intent-to-treat evaluation treatment group effect is also statistically significant ($p = .006$), indicating that the AB 91 program is associated with the hazards or odds of a subsequent DUI conviction among second DUI offenders. The negative parameter estimate and hazard ratio (< 1.00) for the treatment group variable means that second DUI offender non-pilot subjects are associated with a **lower** hazards or odds of a subsequent DUI conviction when compared to AB 91 pilot subjects. Specifically, the AB 91 intent-to-treat evaluation non-pilot comparison group subjects are associated with a lower hazard or odds of a subsequent DUI conviction by 10.8% [(1-.892)*100]. This difference is visually presented in Figure 4.

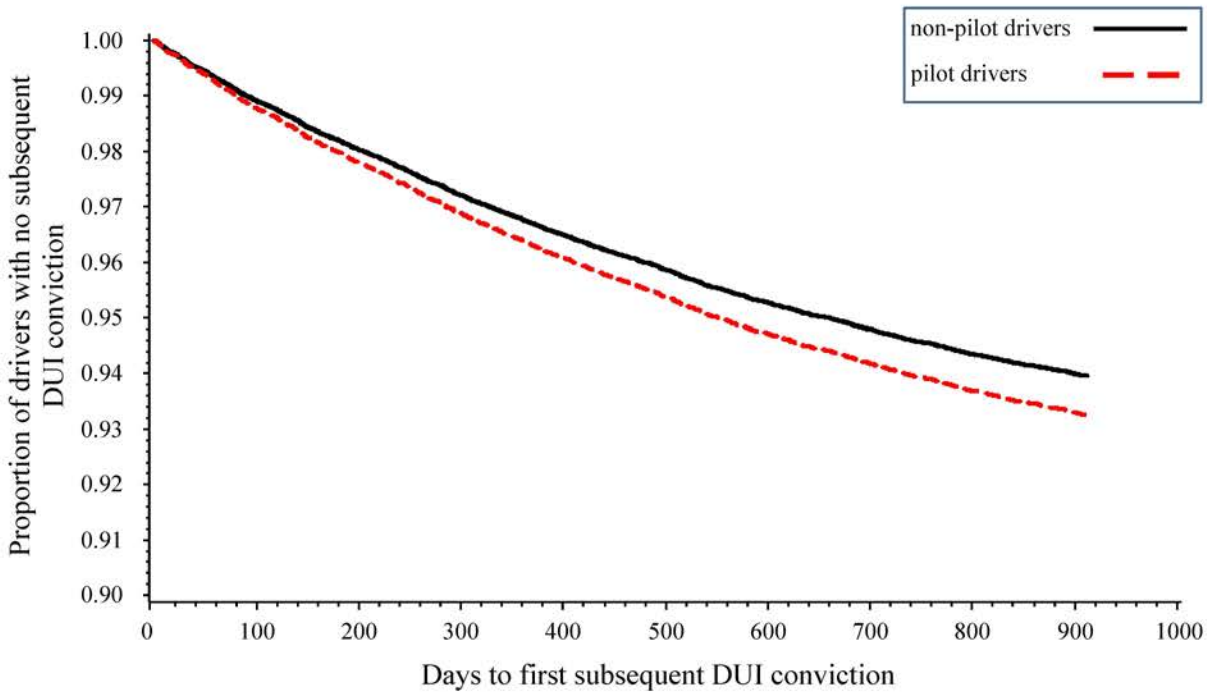

Figure 4. Final survival model: Number of days to first subsequent DUI conviction for second DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

The figure shows that after approximately 200 days the survival rates of a subsequent DUI conviction for the two groups start diverging, with the trend becoming most notable after the first 12 months (365 days). That is, non-pilot subjects have a higher survival throughout the majority of the study period, confirming the results from the statistical analysis.

Days to first subsequent DUI incident. The initial analyses identified prior 3-year major convictions and prior 3-year repeat APS suspensions as the covariates for model inclusion.[17] In addition, no violation of the proportional hazards assumption was detected.

The final Cox regression model fit the two covariates first, adjusting for their effects, followed by the AB 91 program treatment effect for second DUI offenders. The results of this analysis are presented in Table 6.

[17] The repeat APS actions variable represents a count of repeat APS license suspensions initiated due to at least one of the conditions listed in CVC 13353.2 that were present at the time of DUI arrest.

Table 6

Second DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent DUI Incident

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year major convictions	0.2889	73.4864	< .0001	1.335
Prior 3-year repeat APS actions	0.0685	6.2686	.0123	1.071
Treatment/control	-0.1768	23.8468	< .0001	0.838

Note. Likelihood Ratio Chi Square = 107.1224, *p* value < .0001

As displayed in the table, all effects are statistically significant. Of primary interest here is the effect associated with treatment group. The sign and magnitude of the parameter estimate and hazard ratio associated with the treatment group means that comparison group subjects are significantly associated with a **lower** odds or hazards of a subsequent DUI incident by 16.2% [(1-0.838)*100]. This association is illustrated in Figure 5.

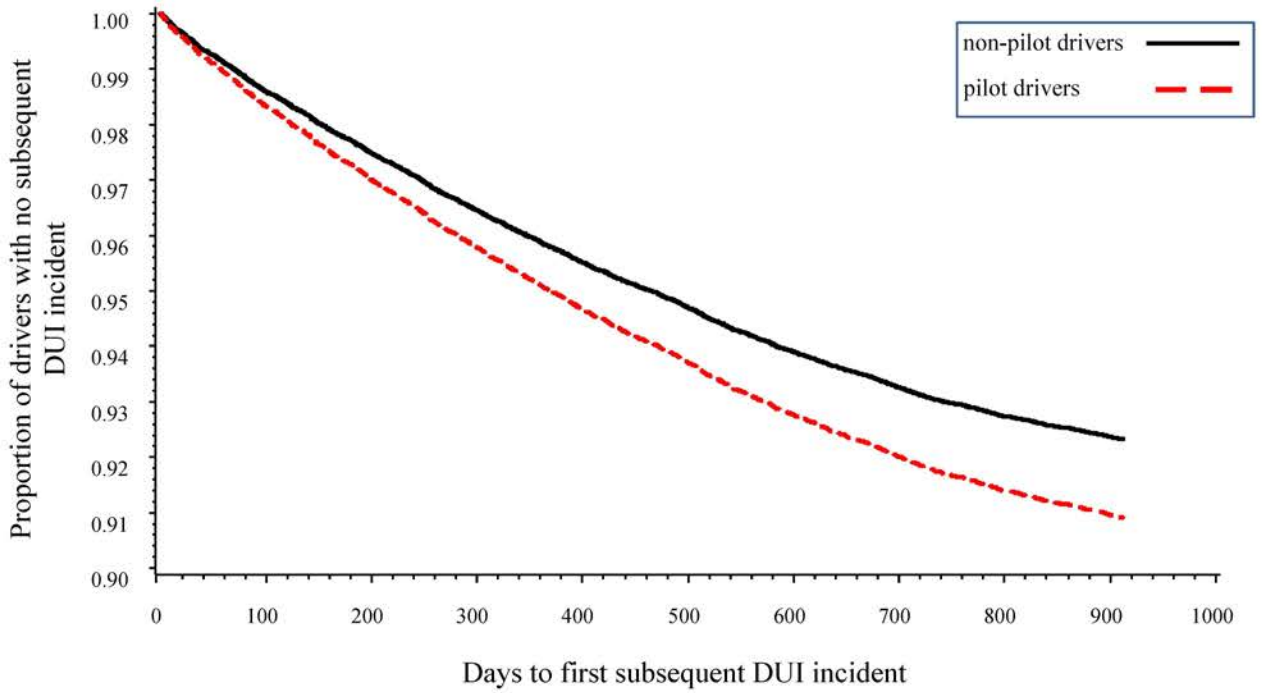

Figure 5. Final survival model: Number of days to first subsequent DUI incident for second DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

As was the case with the subsequent DUI convictions, Figure 5 shows that after approximately 200 days, the survival rates of a subsequent DUI incident notably diverge with the AB 91 non-

pilot subjects having a higher survival throughout the study period. This trend confirms the results from the statistical analyses.

Days to first subsequent crash. The prior 3-year fatal/injury crashes covariate was identified for use in the final model consisting of the propensity score matched treatment/comparison groups. Diagnostic tests indicated that there were no violations of the proportional hazards assumption.

The final Cox survival regression model predicting days to first subsequent crash first fit the prior 3-year fatal/injury crashes covariate, adjusted for its effects, and then entered the treatment group variable. The results are presented in Table 7.

Table 7

Second DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent Crash

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year fatal/injury crashes	0.1811	9.9850	.0016	1.199
Treatment/control	0.0210	0.2228	.6369	1.021

Note. Likelihood Ratio Chi Square = 9.5515, p value = 0.0084

The results from the table show that while the prior 3-year fatal/injury crashes covariate is statistically significant (p = .0016), the treatment group variable is not (p = .6369). Therefore, there is no reliable difference in the odds or hazards of a subsequent crash over the 30-month time period between the second DUI offender treatment and comparison group subjects from the AB 91 intent-to-treat evaluation. This can be seen in Figure 6.

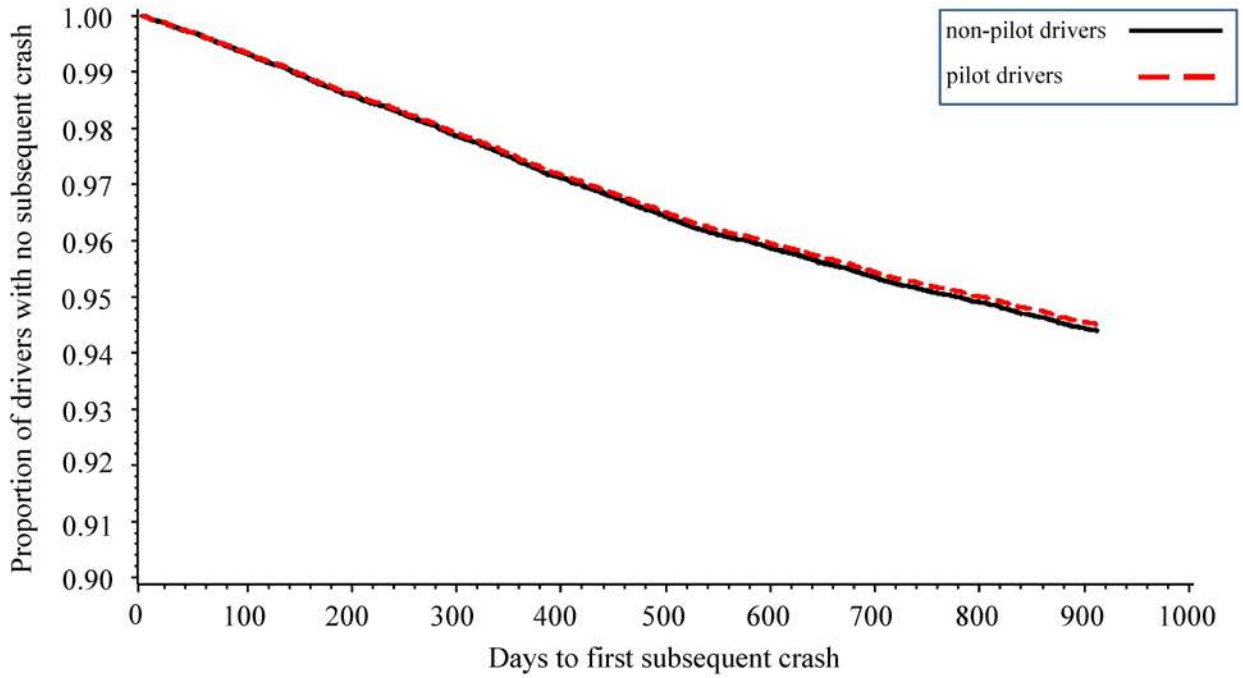

Figure 6. Final survival model: Number of days to first subsequent crash for second DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

The parallel, almost non-distinguishable, survival curves from Figure 6 for both the AB 91 pilot and non-pilot subjects confirm the statistical findings that there is no difference between the groups in regards to the odds or hazards of a subsequent crash over the 30-month time period.

In summary, the analyses associated with the AB 91 second DUI offender intent-to-treat evaluation show that the non-pilot second DUI offender drivers have lower hazards or odds of a subsequent DUI conviction and DUI incident over the 30-month time period. However, the AB 91 pilot and non-pilot second DUI offender groups do not differ with respect to the hazards or odds of a subsequent crash over the same time period.

Third and Subsequent DUI Offenders

The third and subsequent DUI offender AB 91 intent-to-treat evaluation assessed the association between the matched sample of 5,357 treatment group drivers and the 5,357 comparison group drivers identified in Table 1 on the three criteria measures described below. As stated in the Method section, the time period used for third and subsequent DUI offenders was the subsequent

42 months. This time period was chosen to coincide with the post-conviction sanctions and IID/restricted license requirements associated with third and subsequent DUI offenders.

Days to first subsequent DUI conviction. The initial analyses identified prior 3-year total convictions and prior 3-year repeat APS actions as the covariates to use in the subsequent DUI conviction outcome analysis for the AB 91 third and subsequent DUI offenders intent-to-treat evaluation.[18] No violations of the proportional hazards assumption were detected.

The final Cox proportional hazards regression model entered the two covariates first. The second step involved entering the treatment group, thereby assessing the treatment effects after adjusting for the covariates. The results of the main analysis are presented in Table 8.

Table 8

Third and Subsequent DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent DUI Conviction

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year total convictions	0.0807	14.1855	.0002	1.084
Prior 3-year repeat APS actions	0.0952	9.0097	.0027	1.100
Treatment/control	-0.0642	0.8171	.3660	0.938

Note. Likelihood Ratio Chi Square = 29.3118, *p* value = 0.0001

The prior 3-year total convictions and repeat APS actions covariates are statistically significant. More importantly, the results from Table 8 show that, after adjusting for the effects of the two covariates, the treatment group effect is not statistically significant (p = .366), indicating no reliable or systematic difference between the third and subsequent DUI offender AB 91 pilot and non-pilot intent-to-treat evaluation samples. This is pictorially confirmed in Figure 7.

[18] The prior 3–year total convictions variable consists of a count of the total number of convictions for a traffic offense, failure to appear (FTA) in court violations, and traffic violator school (TVS) dismissals. One citation results in a creation of one abstract of conviction and is counted as only one conviction, one FTA, or one TVS even if there are multiple violations included in the abstract (e.g., a driver is cited and convicted for speeding and failing to stop for a red light on one "ticket").

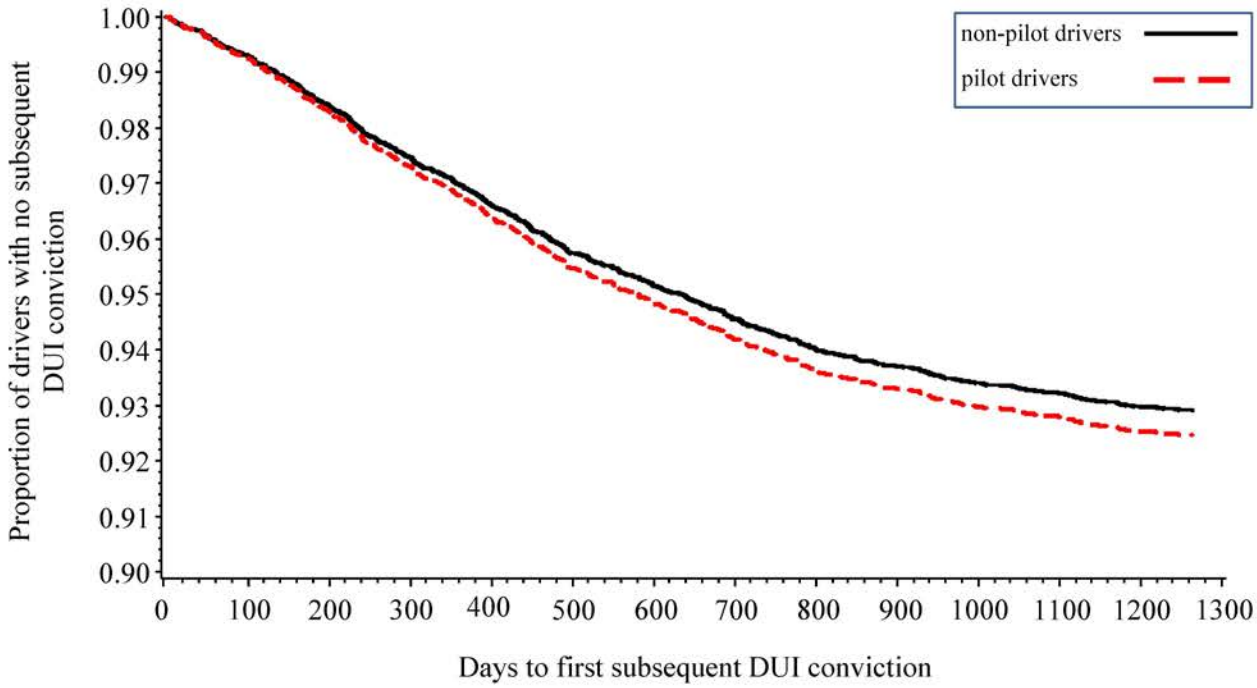

Figure 7. Final survival model: Number of days to first subsequent DUI conviction for third and subsequent DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

Figure 7 shows that while there is some small difference between the treatment and comparison groups on a subsequent DUI conviction, this difference is minimal. In other words, any difference is due to the result of sampling error. The findings from this analysis show no evidence of a difference in the odds or hazards of a subsequent DUI conviction among the third and subsequent DUI offenders associated with the AB 91 intent-to-treat evaluation.

Days to first subsequent DUI incident. Prior 3-year total convictions and prior 3-year repeat APS actions were selected as covariates for the subsequent DUI incident outcome measure. No violations of the proportional hazards assumption were detected for either the two covariates or for the treatment group variable.

The final Cox regression model fit the two covariates first, adjusting for their effects, and followed by the main effect of treatment group. The results of this analysis are presented in Table 9.

Table 9

Third and Subsequent DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent DUI Incident

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year total convictions	0.1124	43.1498	< .0001	1.119
Prior 3-year repeat APS actions	0.0828	10.0341	.0015	1.086
Treatment/control	-0.1829	9.6530	.0019	0.833

Note. Likelihood Ratio Chi Square = 71.8160, *p* value < .0001

As shown in the table, all model effects are statistically significant ($p \leq .05$). The effect of interest is the treatment group which is clearly statistically significant ($p = .0019$). The negative parameter estimate and associated hazard ratio < 1.0 indicate that third and subsequent DUI offenders in the comparison (non-pilot counties) group have a **lower** odds or hazards of a subsequent DUI incident than third and subsequent DUI offenders in the treatment (AB 91 pilot counties) group. Specifically, the hazard ratio in Table 9 indicates that the third and subsequent DUI offenders in AB 91 non-pilot comparison group have an odds or hazards of a subsequent DUI incident approximately 16.7% [(1-.833)*100] lower than that of those in the AB 91 pilot treatment group. The difference between the two groups is graphically illustrated in Figure 8.

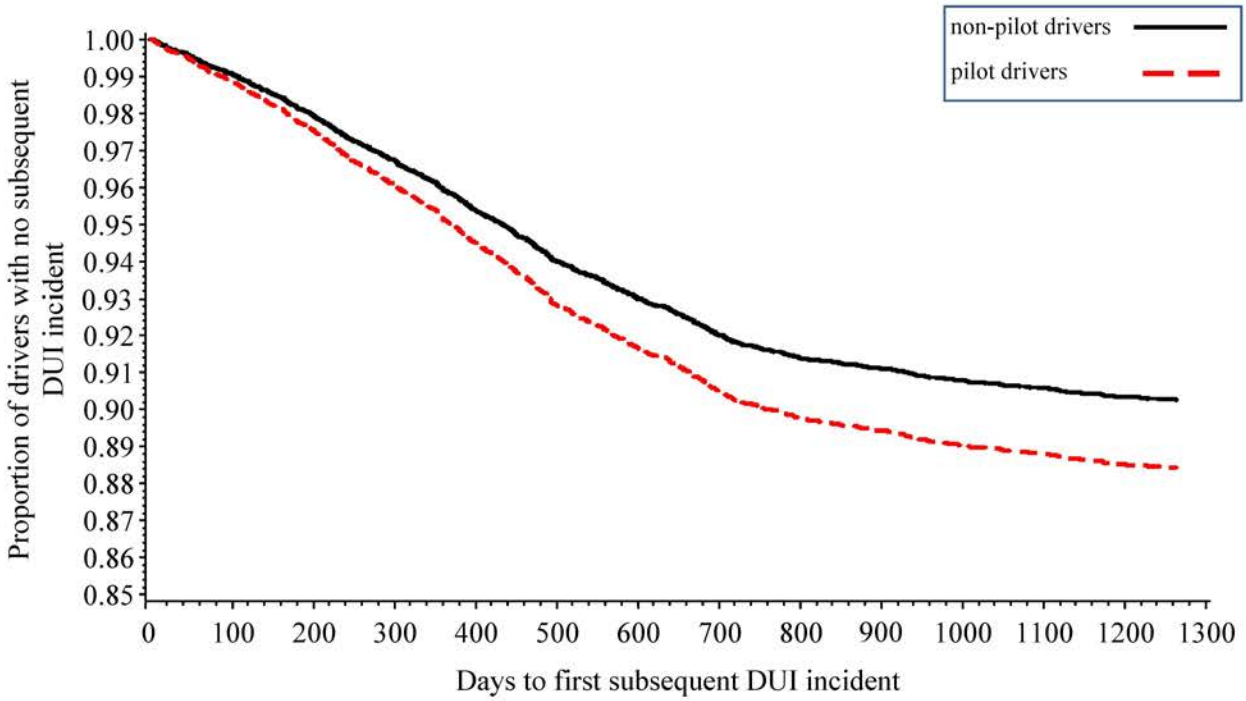

Figure 8. Final survival model: Number of days to first subsequent DUI incident for third and subsequent DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

The higher line in Figure 8 represents the survival rate of a subsequent DUI incident for the non-pilot comparison group drivers, while the lower line is the rate associated with the pilot treatment group drivers. The figures illustrates that the comparison group drivers have a lower subsequent odds or hazards (i.e., greater survival) of a subsequent DUI incident than do the AB 91 pilot intent-to-treat evaluation treatment group drivers. This figure pictorially confirms the results of the statistical analysis presented in Table 9.

Days to first subsequent crash. The prior 3-year total convictions covariate was selected for inclusion in the final survival analysis model. Diagnostic analyses indicated that there was no violation of the proportional hazards assumption.

The final Cox proportional hazards regression model predicting days to first subsequent crash is presented in Table 10.

Table 10

Third and Subsequent DUI Offender AB 91 Intent-to-Treat Evaluation, Cox Regression Model, Days to First Subsequent Crash

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year total convictions	0.1591	45.5510	< .0001	1.172
Treatment/control	0.0145	0.0276	.8680	1.015

Note. Likelihood Ratio Chi Square = 40.4231, *p* value < .0001

The results from the table show that while the prior 3-year total convictions covariate is statistically significant ($p < .0001$), the treatment group variable is not ($p = .8680$). This means that there is no reliable difference in the odds or hazards of a subsequent crash over the 42-month period between the third and subsequent DUI offender treatment and comparison group subjects from the AB 91 intent-to-treat evaluation. This outcome is illustrated in Figure 9.

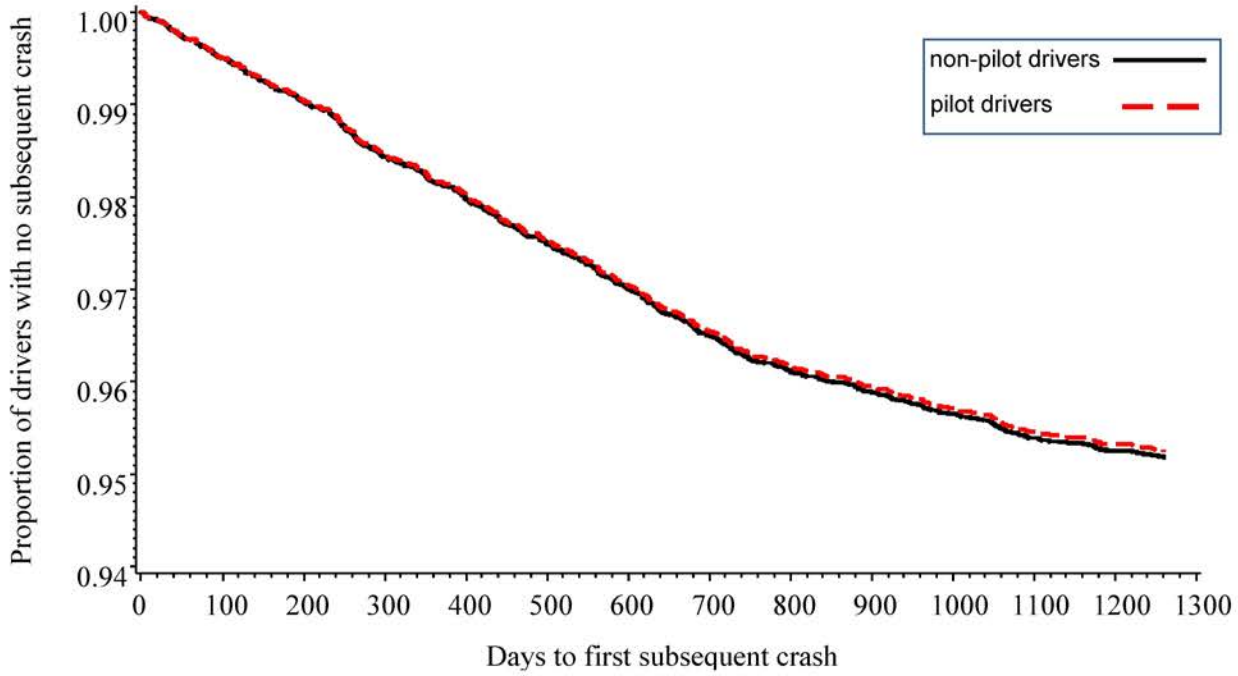

Figure 9. Final survival model: Number of days to first subsequent crash for third and subsequent DUI offenders in the pilot vs. non-pilot counties for the AB 91 intent-to-treat evaluation.

The non-distinguishable, parallel survival curves from Figure 9 for the third and subsequent DUI offenders in both the treatment and comparison groups confirm the statistical findings that there

is no difference between the groups in the odds or hazards of a subsequent crash over the 42-month period.

To summarize, the analyses associated with the AB 91 third and subsequent DUI offender intent-to-treat evaluation show that the comparison group drivers have a lower odds or hazards of a subsequent DUI incident over the 42-month follow-up period. However, the two groups do not significantly differ with respect to the odds or hazards of a subsequent DUI conviction and crash during the same time period.

AB 91 IID/Restricted License Evaluation

This section addresses the effect associated with the AB 91 ignition interlock device and the associated IID-restricted driver license. Specifically, drivers convicted of DUI in one of the four AB 91 pilot counties who actually **installed an IID device** and fulfilled all other requirements for obtaining the **AB 91 IID-restricted driver license** were identified as the treatment group subjects. For this evaluation, the propensity score technique matched DUI offenders in the treatment group with DUI offenders who did not install an IID nor receive a restricted driver license. In other words, the comparison group consisted of DUI offenders who remained suspended or revoked during the study time period. As stated in the Method section, the results from this AB 91 IID/restricted license evaluation address the question as to whether the IID devices themselves can be effective when the AB 91 IID-restricted license is granted, as compared to license suspension or revocation.

First DUI Offenders

The first DUI offender AB 91 IID/restricted license evaluation assessed the association between the matched sample of 27,295 treatment group drivers and the 27,295 comparison group drivers identified in Table 1 on their subsequent DUI convictions, DUI incidents, and crashes. As stated in the Method section, the time period used for first DUI offenders was the subsequent 12 months. This time period was chosen to coincide with the post-conviction sanctions and IID/restricted license requirements associated with first DUI offenders.

Days to first subsequent DUI conviction. The initial step identified gender as the covariate to use in the final outcome model.

With the covariate selected, it was necessary to test whether there was a violation of the proportional hazards assumption associated with either the gender covariate or the treatment group variable. The initial test was informal. This test involved producing sample survival hazard plots for each variable and then checking the plots to determine whether the levels of that variable had hazards proportional over the course of the study. The plots for gender did not indicate an assumption violation. However, the plot associated with the treatment group variable showed evidence of a possible violation of proportional hazards. A somewhat more formal test involved producing and examining plots of the difference between log negative log survival for each variable. This also indicated a possible violation for the treatment group variable.

The final and definitive check of the integrity of the proportional hazards assumption involved computing the likely forms of statistical interactions between each predictor and days to first subsequent DUI conviction in a Cox regression analysis and examining the statistical significance of the interactions. The results showed that although the gender covariate did not violate the proportional hazards assumption, the treatment group did. An examination of the results showed that this moderating relationship was adequately represented through a simple linear interaction with time. Therefore, in order to capture and represent the non-proportionality, the interaction between treatment and days to first subsequent DUI conviction was included in the final Cox regression models.

The first model assessed the overall effects associated with the gender covariate, treatment group, and the treatment group by time interaction. The results of this analysis are presented in Table 11.

Table 11

First DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent DUI Conviction

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Gender	0.2365	14.2029	.0002	1.267
Treatment/control	1.5804	153.8694	< .0001	
Treatment group by time	0.0035	37.4059	< .0001	

Note. Likelihood Ratio Chi Square = 307.2504, *p* value < .0001

Although the gender covariate is statistically significant (p = .0002), the effects of primary interest in Table 11 are the statistically significant treatment group (p < .0001) and treatment group by time interaction (p < .0001).[19] The presence of a significant treatment by time interaction means that the hazard ratio associated with the treatment group and the subsequent DUI conviction criterion measure varies by time. Therefore, it is not possible to represent this relationship with a simple survival curve figure or a single hazard ratio for either the treatment group or for the treatment group by time interaction terms (hence, no hazard ratios are provided for these two terms). One can, however, conclude from Table 11 that given the sign and magnitude of the parameter estimates associated with the treatment group and treatment group by time interactions, the AB 91 IID/restricted license treatment group has a **lower** hazards or odds of a subsequent DUI conviction and that this trend in the odds or hazards tends to **diminish** over time.

With the existence of a statistically significant time by treatment group interaction as displayed in Table 11, the extended Cox regression model is the appropriate statistical technique to apply in order to fully describe the relationship between treatment and the DUI conviction criterion measure.[20] The extended Cox regression model utilizes the parameters, such as those presented in Table 11, to construct and test hazard ratios for selected time intervals. For purposes of statistical significance testing, the hazard ratios are held constant for the specific time interval.

For the days to first subsequent DUI conviction, the specific time intervals were selected to, first, follow the recommended methodological practice of providing relatively equal number of study subjects experiencing the event (occurrence of a subsequent DUI conviction during the subsequent 12-month study period) and censored subjects (no DUI conviction during the subsequent 12-month study period) across the time intervals. This ensures that the standard errors (not displayed) are similar. Secondly, the time periods were chosen to coincide with the temporal requirements of licensing sanctions, eligibility to obtain a restricted driver's license, and with the AB 91 pilot program required time length for IID installation associated with a first DUI offense.

[19] The reader will note that in the following tables, gender is used as a covariate in several analyses. Due to the structure of the data, the sign of the parameter estimate associated with gender is positive in some of the analyses and negative in others, resulting in a hazard ratio less than 1.0 or greater than 1.0. Regardless of the sign and values associated with the gender parameter estimates and hazard ratios, the interpretation is consistent in that males in all analyses in which gender is a covariate have, as expected, a higher odds of subsequent DUI convictions and/or DUI incidents.

[20] For a detailed discussion of the extended Cox regression model, the interested reader is referred to Ata and Sozer (2007), Hosmer and Lemeshow (1999), and Patetta (2006).

Table 12 presents the time intervals and hazard ratios for the extended Cox regression model for the first DUI offender IID/restricted license program evaluation for days to first subsequent DUI conviction.

Table 12

First DUI Offender AB 91 IID/Restricted License Evaluation, Time Intervals and Hazard Ratios for the Extended Cox Regression Model, Days to First Subsequent DUI Conviction

Treatment effect time interval	Hazard ratio	Chi-square	*P* Value
0 to 182 days	0.266	198.8854	< .0001
183 to 365 days	0.569	44.9515	< .0001

For the extended Cox model in Table 12, the referent group is the AB 91 comparison group. Therefore, the results indicate that during the first 182 days following their first DUI conviction, the AB 91 IID/restricted license group is associated with a 73% [(1-.266)*100] lower odds or hazards of a subsequent DUI conviction. During days 183 to 365, the AB 91 IID/restricted license group is associated with a 43% [(1-.569)*100] lower odds or hazards of a subsequent DUI conviction.

In summary, the extended Cox model confirms the results in Table 11 in that the AB 91 IID/restricted license treatment group has a lower odds or hazards of subsequent DUI convictions and that this trend tends to diminish over the 12-month study period.

Days to first subsequent DUI incident. Initial analyses identified gender as the covariate for use in the final survival model assessing the relationship between the treatment group predictor and days to first subsequent 12-month DUI incident.

Sample survival and hazard plots of the gender covariate and the treatment group variable were inspected to assess if the levels of these variables violated the proportional hazards assumption. These diagnostic plots suggested that the treatment group variable might violate the proportional hazards assumption. However, in order to formally check for a violation of the proportional hazards assumption, interaction terms were created for treatment group by time (days to first subsequent DUI incident) and for gender (male versus female) by time. Each interaction term was entered into the Cox regression model after its respective main effect. The findings from

this analysis showed that while there was no assumption violation associated with gender, the treatment group variable showed a violation of the proportional hazards assumption.

Therefore, the final model entered gender first and then followed by the treatment group variable main effect and the treatment by time interaction term. This order adjusted the IID/restricted license treatment group effects associated with days to first subsequent DUI incidents for any effects of the gender covariate. Table 13 shows the findings from this analysis.

Table 13

First DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent DUI Incident

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Gender	0.2184	16.0437	< .0001	1.244
Treatment group	1.6159	199.0571	< .0001	
Treatment group by time	0.0035	47.1234	< .0001	

Note. Likelihood Ratio Chi Square = 414.5158, *p* value < .0001

Table 13 shows that the gender covariate is statistically significant ($p < .0001$) in reducing residual bias from the treatment group variable. The primary effects of interest (treatment and treatment group by time) are also statistically significant ($p < .0001$ for both). As was the case with the DUI conviction analysis presented in the prior section, the significant treatment by time interaction means that the hazard ratio associated with the treatment group and subsequent DUI incident criterion varies with time. As a result, it is not possible to represent this relationship with either a simple survival curve or single hazard ratio. An inspection of the parameter estimates from Table 13 does allow one to conclude that the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of a subsequent DUI incident and that this trend in the odds or hazards tends to **diminish** over time.

The presence of the statistically significant treatment by time interaction necessitates the use of the extended Cox regression model to correctly model and assess the association of treatment and a subsequent DUI incident during specific time intervals spanning the 365 days of the study. As was the case with the treatment by time interaction for the DUI conviction outcome, specific time intervals were constructed for the treatment by time interaction association with the DUI incident outcome in order to ensure similar standard errors and event/censored cases and to

reflect the time-based provisions for first DUI offender license suspension, eligibility for license restriction, and the AB 91 pilot-related IID installations.

Table 14 shows the time intervals and hazard ratios for the extended Cox regression model for the first DUI offender AB 91 IID/restricted license evaluation for days to first subsequent DUI incident.

Table 14

First DUI Offender AB 91 IID/Restricted License Evaluation, Time Intervals and Hazard Ratios for the Extended Cox Regression Model, Days to First Subsequent DUI Incident

Treatment effect time interval	Hazard ratio	Chi-square	*P* Value
0 to 182 days	0.257	263.0142	< .0001
183 to 365 days	0.549	67.9934	< .0001

As the referent group in Table 14 is the AB 91 comparison group, the results indicate that during the first 182 days following their first DUI conviction, the AB 91 IID/restricted license group was associated with a 74% [(1-.257)*100] lower odds or hazards of a subsequent DUI incident. During days 183 to 365, the AB 91 IID/restricted group was associated with a 45% [(1-.549)*100] lower odds or hazards of a subsequent DUI incident.

To summarize, the AB 91 IID/restricted license group of first DUI offenders has a lower odds or hazards of subsequent DUI incidents, and this trend tends to diminish over the 12-month study period.

Days to first subsequent crash. Initial analyses identified the count of prior 3-year total crashes as the covariate for use in the final survival model assessing the relationship between treatment group and days to first subsequent crash over the 12-month period.[21]

After identifying the total crash covariate, the next step involved determining whether the Cox proportional hazards assumption was violated with either total crashes or the treatment group variable. The initial, informal test involved constructing hazard plots for each variable and then checking the plots to determine whether the levels of either variable showed non-proportional

[21] The total crash covariate is a count of the total number of crashes on the DRM. These crashes may be reported by law enforcement agencies and/or drivers involved in the crashes.

hazards over the course of the study. The plots for total crashes did not indicate an assumption violation. However, the plot associated with the treatment group displayed evidence of a possible proportional hazards violation. The more formal test consisting of plots of the difference between log negative log survival for each variable also indicated a potential violation associated with the treatment group variable.

The final and formal test of the proportional hazards assumption consisted of computing the likely forms of statistical interaction between each predictor and days to first subsequent crash and testing the significance of the interactions. The results showed that although the prior 3-year total crashes covariate did not violate the proportional hazards assumption, the treatment group did and that this interaction was represented through a simple linear trend with time. Therefore, to incorporate the non-proportionality, the moderating relationship between treatment and days to first subsequent crash was included in the final Cox regression models.

The first Cox outcome survival model included the overall effects associated with the prior 3-year total crashes covariate, treatment group, and the treatment group by time interaction. The results are displayed in Table 15.

Table 15

First DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent Crash

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year total crashes	0.2057	38.7164	< .0001	1.228
Treatment group	-0.0928	0.9116	.3397	
Treatment group by time	0.0020	19.1876	< .0001	

Note. Likelihood Ratio Chi Square = 160.0508, *p* value < .0001

Prior 3-year total crashes is statistically significant ($p < .0001$), indicating that remaining bias associated with this variable following creation of the propensity score matched sample has been removed from the subsequent crash outcome analyses.

Table 15 also indicates that the treatment effect was not statistically significant ($p = .3397$). However, the treatment group by time interaction is statistically significant ($p < .0001$).[22] Due to

[22] For the reader interested in the statistical details of these terms, the treatment main effect in the interaction model refers to the difference between treatment and comparison group at the origin of the process. That the two groups do

the presence of the treatment by time interaction, the model cannot be explained by a single hazard ratio or survival curve due to the hazard ratios varying by time. However, one can generally conclude from the parameter estimates in the table that the AB 91 IID/restricted license group is associated with **higher** odds or hazards of a subsequent crash and that this trend in the odds or hazards becomes **greater** over time.

As was the case with the subsequent DUI conviction and DUI incident criteria results reported in the prior two sections, the existence of the time by treatment interaction necessitates the use of the extended Cox regression model to adequately explain in detail the relationship between the crash occurrence during the subsequent 12-month time period and the treatment versus comparison groups for the AB 91 IID/restricted license evaluation. Specific to the crash outcome, different time intervals than those identified for DUI conviction and DUI incident outcomes were constructed for the treatment by time interaction associated with the crash outcome in order to ensure similar standard errors and event/censored cases and to reflect the time-based provisions for first DUI offender post-conviction license suspension, and the AB 91 pilot requirements to install an IID and to obtain a restricted license.

Table 16 presents the time intervals and hazard ratios for the extended Cox survival regression model.

Table 16

First DUI Offender AB 91 IID/Restricted License Evaluation, Time Intervals and Hazard Ratios for the Extended Cox Regression Model, Days to First Subsequent Crash

Treatment effect time interval	Hazard ratio	Chi-square	*P* Value
0 to 99 days	1.092	0.8749	.3496
100 to 199 days	1.568	26.2197	< .0001
200 to 365 days	1.975	95.4103	< .0001

The referent group for the extended Cox survival regression model in Table 16 is the AB 91 comparison group. Therefore, the results indicate the following:

not significantly differ in hazards at the early time intervals will be explicitly illustrated in the discussion associated with the following table. The interested reader is referred to Allison (1995) for a detailed discussion of parameter interpretation in Cox models containing time dependent covariates.

- During the first 99 days following their first DUI conviction, first DUI offenders in the AB 91 IID/restricted license and the comparison groups do not significantly differ ($p = .3496$) in their odds or hazards for a subsequent crash.[23]

- During days 100 to 199 following their first DUI conviction, the AB 91 IID/restricted license group of first DUI offenders is associated with the odds or hazards of a subsequent crash that is approximately 1.57 times greater (56.8% higher) than the comparison group. This difference is statistically significant ($p < .0001$).

- During days 200 to 365 following their first DUI conviction, the AB 91 IID/restricted license first DUI offender group is associated with the odds or hazards of a subsequent crash that is approximately 1.98 times greater (97.5% higher) than the comparison group. This difference is statistically significant ($p < .0001$).

The results from the extended Cox survival regression analysis confirm those in Table 15 in that the AB 91 IID/restricted license treatment group has a higher odds or hazards of a subsequent crash after approximately 3 months, and that this trend increases over the 12-month study period.

In summary, the results from the first DUI offender AB 91 IID/restricted license evaluation show that the IID/restricted license treatment group exhibits a statistically significant lower odds or hazards for a subsequent DUI conviction and DUI incident but that the trend tends to decrease over time. For subsequent crashes, the results show that the IID/restricted license treatment group exhibits a statistically significant higher odds or hazards than the comparison group and that this trend increases over time.

Second DUI Offenders

The second DUI offender AB 91 IID/restricted license evaluation assessed the association between the matched sample of 7,315 treatment group drivers and the 7,315 comparison group drivers identified in Table 1 on the three outcome measures. As stated in the Method section, the time period used for second DUI offenders was the subsequent 30 months. This time period was chosen to coincide with the post-conviction sanctions and IID/restricted license requirements associated with second DUI offenders.

[23] This validates the main effect parameter from Table 15 in that the groups did not differ at the origin of the process for approximately the subsequent 3 months.

Days to first subsequent DUI conviction. The initial analyses identified both gender and prior 3-year total convictions as the covariates for use in the final DUI conviction outcome models.

After selecting the covariates, it was necessary to test for the presence of the proportional hazards assumption violation associated with gender and/or the prior 3-year total convictions covariates and the treatment group variable. The first test was informal and simply involved producing sample survival hazard plots for each variable to check the plots for visual evidence of a proportional hazards violation over the course of the 30-month study period. Neither covariate appeared to violate the assumption; however, a visual inspection of data indicated possible non-proportionality associated with the treatment group hazard rates over time.

A Cox regression analysis was conducted as the final and formal check of the proportionality assumption. This analysis tested the likely forms of the statistical interactions between each predictor and days to first subsequent DUI conviction. The results confirmed that there were no violations associated with the covariates; however, the analyses showed a statistically significant ($p < .05$) violation associated with the treatment group variable. The interaction between treatment and days to first subsequent DUI conviction was included in the final Cox survival regression models to correctly represent the non-proportionality in the hazards.

Table 17 presents the first model assessing the overall association between days to first subsequent DUI conviction (in the 30 months after conviction) and gender, prior 3-year total convictions, treatment, and the treatment by time interaction.

Table 17

Second DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent DUI Conviction

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Gender	-0.1744	3.7931	.0515	0.840
Prior 3-year total convictions	0.1117	25.3168	< .0001	1.118
Treatment group	1.3509	85.8706	< .0001	
Treatment group by time	0.0011	15.0349	.0001	

Note. Likelihood Ratio Chi Square = 192.1373, *p* value = .0001

The entries in Table 17 show that the gender covariate is marginally significant ($p = .0515$) and that the prior 3-year total convictions variable is statistically significant ($p < .0001$). Together,

these two covariates removed any remaining bias along these two multivariate dimensions following the formation of the propensity score matched treatment and comparison groups.

Table 17 also indicates that the treatment group ($p < .0001$) and the treatment group by time interactions ($p = .0001$) are statistically significant. The presence of the interaction means that it is not possible to represent the relationship between treatment and a subsequent DUI conviction with a single hazard ratio or survival curve as the hazard ratios vary by time. However, one can conclude from an examination of the sign and magnitude of the parameter estimates from Table 17 that the AB 91 IID/restricted license treatment group has a **lower** odds or hazards of subsequent DUI conviction and that this trend **diminishes** over time.

To fully and adequately examine the relationship between the AB 91 IID/restricted license treatment and the DUI conviction outcome measure over time, an extended Cox regression model was constructed from the parameters in Table 17. As was the case in the prior applications of this statistical technique, the time intervals constructed and tested for statistical significance were selected to (1) provide a relatively equal number of events (occurrence of a subsequent DUI conviction during the subsequent 30-month study period) and censored observations (no subsequent DUI conviction in the same time period) across the time intervals to ensure that the standard errors are similar and (2) to reflect the temporal requirements of licensing sanctions, eligibility to obtain an IID-restricted license, and the AB 91 pilot specific IID installation provisions associated with the second DUI offenders. Table 18 displays the time intervals and hazard ratios for this extended Cox regression model.

Table 18

Second DUI Offender AB 91 IID/Restricted License Evaluation, Time Intervals and Hazard Ratios for the Extended Cox Regression Model, Days to First Subsequent DUI Conviction

Treatment effect time interval	Hazard ratio	Chi-square	*P* Value
0 to 364 days	0.330	93.8976	< .0001
365 to 730 days	0.405	55.4397	< .0001
731 days and subsequent	0.825	1.1045	.2933

The referent group for the extended Cox model in Table 18 is the AB 91 comparison group. Therefore, the results are interpreted as follows:

- During the first 364 days following their conviction for a second DUI offense, the AB 91 IID/restricted license group is associated with a statistically significant ($p < .0001$) 67% [(1-.330)*100] lower odds or hazards of a subsequent DUI conviction.

- During days 365 to 730 following their conviction for a second DUI offense, the AB 91 IID/restricted license group is associated with a statistically significant ($p < .0001$) 60% [(1-.405)*100) lower odds or hazards of a subsequent DUI conviction.

- During days 731 and subsequent following their conviction for a second DUI offense, the hazard ratio between the AB 91 IID/restricted license group and the comparison group is not statistically significant ($p = .2933$).

The results from Table 18 confirm that the second DUI offender AB 91 IID/restricted license group has a lower odds or hazards of a subsequent DUI conviction. However, this trend diminishes over time, and the difference between the treatment and comparison groups is no longer statistically significant after 730 days following the conviction of a second DUI offense.

Days to first subsequent DUI incident. Gender and prior 3-year total convictions were identified as the covariates for use in the final survival model assessing the relationship between the treatment group variable and days to first subsequent DUI incident over the 30-month time period.

Examination of the sample survival and hazard plots indicated that there was a potential violation of the proportional hazards assumption associated with the treatment variable. The Cox regression model formally testing for the covariates and treatment by time interactions indicated that while there was no violation associated with the covariates, there was a significant ($p < .05$) violation associated with treatment.

With the existence of the significant time by treatment interaction, the final Cox model entered the gender and prior 3-year total convictions covariates first, and then the treatment and treatment by time interaction terms. Table 19 shows the results from this analysis.

Table 19

Second DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent DUI Incident

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Gender	-0.1868	5.6193	.0178	0.830
Prior 3-year total convictions	0.1155	35.1477	< .0001	1.122
Treatment group	1.4282	121.0799	< .0001	
Treatment group by time	0.0012	21.7996	< .0001	

Note. Likelihood Ratio Chi Square = 273.6750, *p* value = .0001

Table 19 shows that the gender and prior 3-year total convictions covariates are statistically significant ($p = .0178$ and $p < .0001$, respectively).

The reader will also note from Table 19 that the treatment group effect ($p < .0001$) and the treatment group by time interaction effect ($p < .0001$) are statistically significant. Therefore, the model cannot be represented by a single hazard ratio or survival curve due to the hazard ratios varying by time. One can generally conclude from the parameter estimates in the table that the second DUI offender AB 91 IID/restricted license treatment group has a **lower** odds or hazards of a subsequent DUI incident and that this trend **diminishes** over time.

As was the case with the prior DUI conviction criterion measure, an extended Cox regression model was constructed to fully examine the nature of the relationship between treatment and the DUI incident criterion over time. Table 20 displays the time-dependent hazard ratios and related significance tests from this extended Cox model.

Table 20

Second DUI Offender AB 91 IID/Restricted License Evaluation, Time Intervals and Hazard Ratios for the Extended Cox Regression Model, Days to First Subsequent DUI Incident

Treatment effect time interval	Hazard ratio	Chi-square	*P* Value
0 to 364 days	0.305	138.0654	< .0001
365 to 730 days	0.418	71.1442	< .0001
731 days and subsequent	0.818	1.3119	.2520

The referent group for Table 20 is the AB 91 comparison group. The results are to be interpreted as follows:

- During the first 364 days following their conviction for a second DUI offense, the AB 91 IID/restricted license group is associated with a statistically significant ($p < .0001$) 70% [(1-.305)*100] lower odds or hazards of a subsequent DUI incident.

- During days 365 to 730 following their conviction for a second DUI offense, the AB 91 IID/restricted license group is associated with a statistically significant ($p < .0001$) 58% [(1-.418)*100] lower odds or hazards of a subsequent DUI incident.

- During days 731 and subsequent following their conviction for a second DUI offense, the hazard ratio between the AB 91 IID/restricted license group and the comparison group is not statistically significant ($p = .2520$).

In summary, the results from Table 20 confirm the interpretation of the parameter estimates from Table 19 in that the second DUI offender AB 91 IID/restricted license group has a lower odds or hazards of a subsequent DUI incident when compared to the second DUI offenders in the comparison group for this evaluation. This trend diminishes over time, and the difference between the treatment and comparison groups is no longer statistically significant after 730 days following the second DUI offense conviction.

Days to first subsequent crash. The initial analyses identified prior 3-year total convictions and prior 3-year total crashes as the covariates for use in the final survival model assessing the relationship between the treatment group variable and days to first subsequent crash over the period of 30 months.

A visual inspection of the sample survival and hazard plots implied that there was a potential violation of the proportional hazards assumption associated with the treatment variable. To formally test for the assumption violation, a Cox regression model with the covariates and treatment by time interactions was fit. The results from the model indicated that there was no assumption violation present among the covariates but that there was a violation of the proportional hazards assumption associated with the treatment group predictor.

The final Cox model for assessing the crash criterion entered, during the first step, the two covariates. The second step involved entering the treatment and the treatment by time interaction term to account for the time-varying hazard ratios. The results from this analysis are presented in Table 21.

Table 21

Second DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent Crash

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Prior 3-year total convictions	0.1078	23.1940	< .0001	1.114
Prior 3-year total crashes	0.2114	19.5299	< .0001	1.235
Treatment group	-0.0824	0.3437	.5577	
Treatment group by time	0.0007	6.7840	.0092	

Note. Likelihood Ratio Chi Square = 89.1692, *p* value < .0001

As shown in Table 21, the prior 3-year total convictions and prior 3-year total crashes covariates are statistically significant (both with *p* values < .0001).

Table 21 also indicates that the treatment group effect (at the origin of the process) is not statistically significant ($p = .5577$). However, the treatment group by time interaction effect is statistically significant ($p = .0092$). Due to the presence of the treatment by time interaction, the model cannot be represented by a single hazard ratio or survival curve due to the hazard ratios varying by time. However, one can generally conclude from the parameter estimates in the table that the second DUI offender AB 91 IID/restricted license group is associated with **higher** odds or hazards of a subsequent crash and that this trend becomes **greater** over time.

Similar to the protocol for the DUI conviction and DUI incident analyses, an extended Cox regression model was constructed to thoroughly examine the structure of the relationship between treatment group and the crash criterion over time. Table 22 displays the time-dependent hazard ratios and related significance tests from this regression model.

Table 22

Second DUI Offender AB 91 IID/Restricted License Evaluation, Time Intervals and Hazard Ratios for the Extended Cox Regression Model, Days to First Subsequent Crash

Treatment effect time interval	Hazard ratio	Chi-square	*P* Value
0 to 299 days	1.174	1.8376	.1752
300 to 730 days	1.577	20.6119	< .0001
731 days and subsequent	2.164	17.9084	< .0001

The referent group for the extended Cox survival regression model in Table 22 is the AB 91 comparison group. Therefore, the results indicate the following:

- During the first 299 days following their second DUI conviction, there is no statistically significant (p = .1752) difference between the AB 91 IID/restricted license group and the comparison group on the odds or hazards of a subsequent crash.

- During the period from day 300 to day 730, the AB 91 IID/restricted license group is associated with a subsequent crash odds or hazards that is approximately 1.58 times greater (58% higher) than the comparison group. This difference is statistically significant (p < .0001).

- During the period from day 731 and subsequent following their second DUI conviction, the AB 91 IID/restricted license group is associated with a subsequent crash odds or hazards that is approximately 2.16 times greater (116% higher) than the comparison group. This difference is statistically significant (p < .0001).

The results from this analysis confirm those in Table 21 in that the AB 91 IID/restricted group has a higher odds or hazards of a subsequent crash and that this trend increases over the 30-month study period.

In summary, the results from the second DUI offender AB 91 IID/restricted license evaluation show that the IID/restricted license treatment group exhibits a statistically significant lower odds or hazards for a subsequent DUI conviction and DUI incident, but that these trends decrease over time. In terms of a subsequent crash, the results show that the IID/restricted license treatment

group has a statistically significant higher odds or hazards than the comparison group and that this trend increases over time.

Third and Subsequent DUI Offenders

The third and subsequent DUI offender AB 91 IID/restricted license evaluation assessed the association between the matched sample of 1,100 treatment group drivers and the 1,100 comparison group drivers identified in Table 1 on the three outcome measures. As stated in the Method section, the time period used for third and subsequent DUI offenders was the subsequent 42 months. This time period was chosen to coincide with the post-conviction sanctions and IID/restricted license requirements associated with third and subsequent DUI offenders.

Days to first subsequent DUI conviction. The initial analyses indicated that no covariate was necessary for inclusion in the final outcome model. In other words, the propensity score matching process was successful in removing bias between the treatment/comparison groups on the measured factors. In addition, no violation of the proportional hazards assumption was detected.

The final Cox proportional hazards model thus contained only the treatment group variable. The results are displayed in Table 23.

Table 23

Third and Subsequent DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent DUI Conviction

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Treatment group	1.2231	40.0582	< .0001	3.398

Note. Likelihood Ratio Chi Square = 47.5101, *p* value = .0001

The results from the table indicate that the comparison group subjects have a significantly ($p < .0001$) **higher** odds or hazards of a subsequent DUI conviction than do the treatment group subjects. Specifically, the hazard ratio in Table 23 means that the comparison group subjects have an odds or hazards of a subsequent DUI conviction that is approximately 3.4 times higher than that associated with the treatment group. This difference is graphically illustrated in Figure 10.

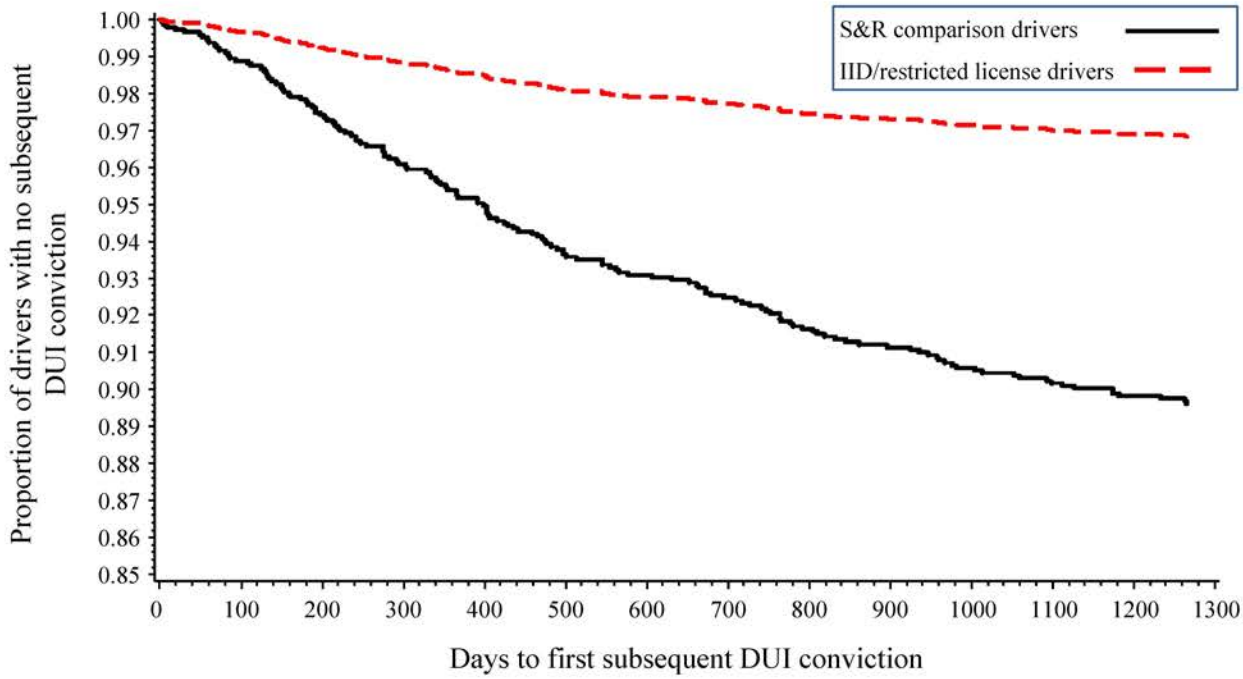

Figure 10. Final survival model: Number of days to first subsequent DUI conviction for third and subsequent DUI offenders in the treatment vs. comparison groups for the AB 91 IID/restricted license evaluation.

The higher line in Figure 10 represents the survival rate of a subsequent DUI conviction for the AB 91 IID/restricted license group; the lower line is the rate associated with the comparison group offenders. This figure pictorially confirms the results of the statistical analysis presented in Table 23.

Days to first DUI incident. Results from the initial analyses indicated that there was no need to include any covariates in the final outcome equations. Therefore, the propensity score process was successful in removing bias between the treatment/comparison groups on the measured factors. The diagnostic analyses also indicated that there was no violation of the proportional hazards assumption.

The final Cox proportional hazards model containing the treatment group variable is presented in Table 24.

Table 24

Third and Subsequent DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent DUI Incident

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Treatment group	1.2289	54.2021	< .0001	3.417

Note. Likelihood Ratio Chi Square = 64.2348, *p* value = .0001

The model parameters from the table show that the comparison group subjects have a significantly (p <.0001) **higher** odds or hazards of a subsequent DUI incident than do the treatment group subjects. That is, similar to results from the DUI conviction outcome model, the hazard ratio in Table 24 means that the comparison group subjects have an odds or hazards of a subsequent DUI incident approximately 3.4 times higher than that associated with the AB 91 IID/restricted group. This difference is illustrated in Figure 11.

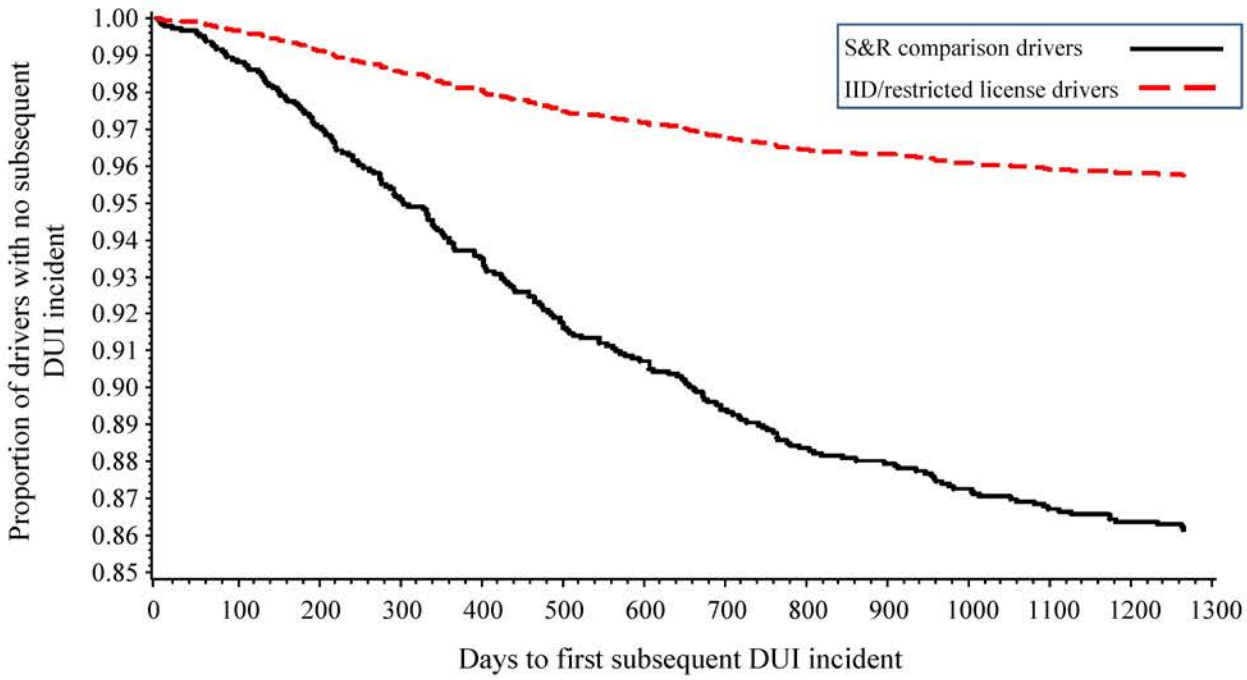

Figure 11. Final survival model: Number of days to first subsequent DUI incident for third and subsequent DUI offenders in the treatment vs. comparison groups for the AB 91 IID/restricted license evaluation.

The higher line in Figure 11 represents the survival rate of a subsequent DUI conviction for the AB 91 IID/restricted license group. The lower line is the rate associated with the comparison group drivers. The figure shows that the AB 91 IID/restricted license group has a lower subsequent odds or hazards (greater survival) of a DUI incident. The curves in the figure confirm results of the statistical analysis presented in Table 24.

Days to first subsequent crash. Initial analyses indicated that the propensity score process was successful in removing bias between the treatment/comparison groups on the measured factors. Therefore, no covariate adjustment was necessary in the final outcome mode. The diagnostic analyses also indicated that the proportional hazards assumption was met.

Table 25 presents the results of the final Cox proportional hazards model.

Table 25

Third and Subsequent DUI Offender AB 91 IID/Restricted License Evaluation, Cox Regression Model, Days to First Subsequent Crash

Variable	Parameter estimate	Chi-square	*P* Value	Hazard ratio
Treatment group	-0.3953	4.556	.0328	0.673

Note. Likelihood Ratio Chi Square = 4.6423, *p* value = 0.0312

The negative parameter estimate and associated hazard ratio < 1.0 indicate that the third and subsequent DUI offenders in the comparison group have a significantly (p = .0328) **lower** odds or hazards of a subsequent crash than those in the AB 91 IID/restricted license group. Specifically, the hazard ratio in Table 25 indicates that the comparison group has an odds or hazards of a subsequent crash approximately 33% [(1-.673)*100] less than that of the AB 91 IID/restricted license group. The difference between the two groups is pictorially presented in Figure 12.

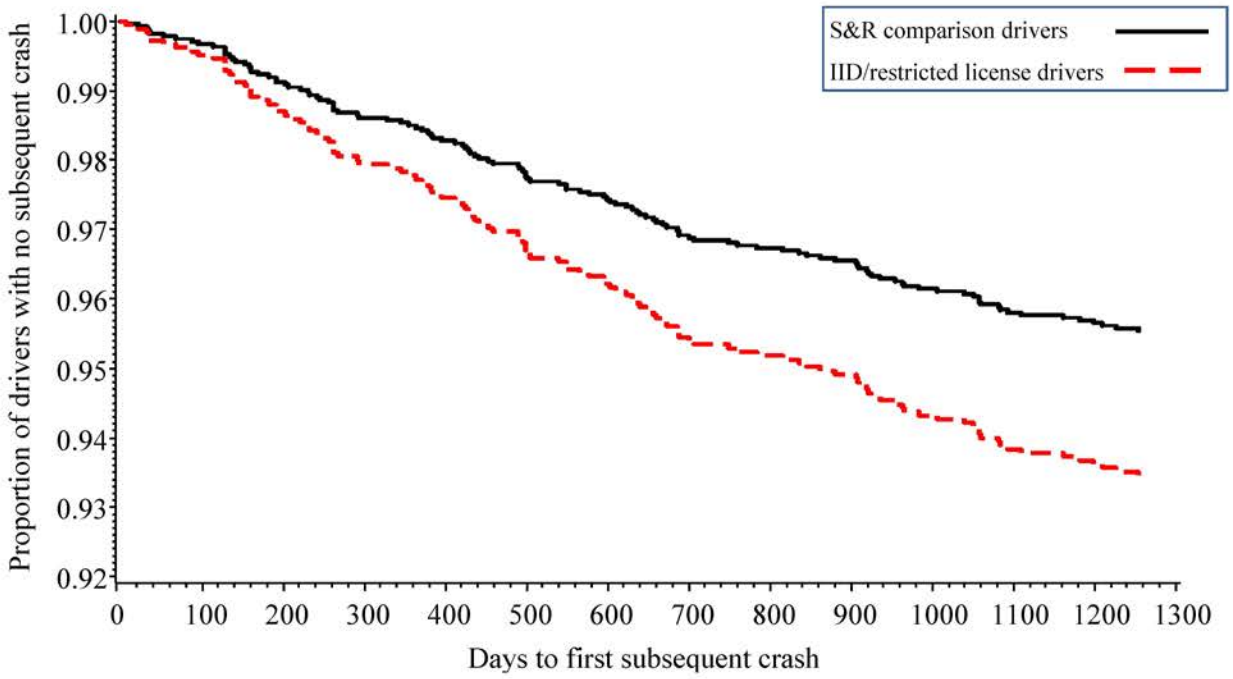

Figure 12. Final survival model: Number of days to first subsequent crash for third and subsequent DUI offenders in the treatment vs. comparison groups for the AB 91 IID/restricted license evaluation.

The higher line in Figure 12 represents the survival rate of a subsequent crash in the 42-month follow-up period for the comparison group, while the lower line is the subsequent survival rate associated with the AB 91 IID/restricted license group. The figure illustrates that third and subsequent DUI offenders in the comparison group have a lower odds or hazards (greater survival) of a subsequent crash than do the same type of DUI offenders in the AB 91 IID/restricted license group. The figure confirms the results of the statistical analysis presented in Table 25.

To summarize, the analyses associated with the third and subsequent DUI offender AB 91 IID/restricted license evaluation show that the treatment group drivers have a significantly lower odds or hazards of a subsequent DUI conviction and DUI incident over the 42-month time period. However, the comparison group has a significantly lower odds or hazards of a subsequent crash during the same time period.

DISCUSSION

Study Limitations

Before discussing the study's results and offering recommendations, it is informative to consider the data and statistical limitations present in the analyses.

In this study, like in many other evaluation program studies, it was not possible to randomly assign study subjects to the AB 91 pilot program treatment and comparison groups. That is, there was no mechanism to randomly assign DUI offenders within the four counties to the AB 91 program or comparison group interventions. Therefore, potential biases due to preexisting differences were statistically controlled to the extent possible by matching treatment and comparison group subjects based on a propensity score matching technique and by using prior driving record data and demographic variables as covariates in the analyses. It should be noted that while the propensity score and covariate adjustment techniques utilized in the present study statistically equated the DUI offender groups for each evaluation on dimensions measured by the covariates, there are limits to the effectiveness of such statistical controls. The most substantial limitation is that in quasi-experimental designs of the kind used in the present study, it is inherently difficult to capture and measure all of the factors on which groups differ and which would impact their subsequent outcome on DUI convictions, DUI incidents, and crashes. Although strong statistical adjustments were employed to control potential bias between the offender groups, there remains the possibility that uncontrolled bias operated to affect study results. However, for such a bias to threaten the validity of the results reported in the present study, one would have to empirically identify for the study data an unmeasured variable(s) that would account for the relationship between treatment/comparison group assignment and the outcome measures completely unrelated to the variables used to create the propensity score matched samples and used in the covariate adjustment – an unlikely scenario. Therefore, due to the quasi-experimental nature of this study, the results do not prove a positive or negative causal impact of the AB 91 pilot program. Instead, they illustrate relationships between the AB 91 pilot and subsequent DUI convictions, DUI incidents, and crashes that are suggestive of its effect on traffic safety.

In addition, the four counties where the AB 91 pilot program was implemented were not randomly selected to be similar to all statewide counties. Instead, the AB 91 pilot program was implemented in four counties (Alameda, Los Angeles, Sacramento, and Tulare) which might not

necessarily be representative of the entire State of California in terms of the population of DUI offenders in those counties, their individual characteristics, the traffic environment, and county- or municipal-level characteristics. It is, for example, possible that there was a geographical bias in the study or that there were differences between DUI offenders from AB 91 pilot counties and those from non-pilot counties in their characteristics related to DUI recidivism and crash involvement. Therefore, it is uncertain to what extent the study results can generalize to all counties and drivers throughout California. However, this potential bias is mitigated by the fact that the demographic and driver record indices associated with the DUI offender groups in the AB 91 pilot counties are similar to statewide indices reported for DUI offender groups in the Department's DUI MIS report (Oulad Daoud et al., 2015).

The lack of randomization at both the county and individual level that is described in the above paragraphs negated the use of any statistical techniques to estimate the number of crashes and DUI convictions and incidents prevented, caused, and/or attributed to the AB 91 program. Therefore, any attempt to extrapolate beyond the relative risk measures (i.e., odds and hazards ratios) presented in this report with an attempt to estimate the number of such crashes and DUI convictions and incidents both statewide and within the AB 91 pilot counties would be inappropriate and would produce both erroneous and misleading results.

Summary of Findings

Table 26 summarizes the main study findings for both the AB 91 program and the AB 91 IID/restricted license evaluations presented for each DUI offender group and for each outcome measure.

As shown in the table, the AB 91 intent-to-treat evaluation results indicate that the occurrence of a subsequent DUI conviction or DUI incident among first DUI offenders in the pilot counties is not different from the occurrence of a subsequent DUI conviction or DUI incident among the same offenders in non-pilot counties. However, first DUI offenders from AB 91 pilot counties have statistically significant higher crash risk than those in non-pilot counties, and the difference in crash risk between the two groups is consistent over time.

Table 26

Summary of Study Findings

	AB 91 intent-to-treat evaluation			AB 91 IID/restricted license evaluation		
	DUI offender group			DUI offender group		
Outcome	1st	2nd	3rd and subsequent	1st	2nd	3rd and subsequent
DUI convictions	No statistical difference	Statistically significant, lower risk associated with comparison group, difference consistent over time	No statistical difference	Statistically significant, lower risk associated with treatment group, difference decreases over time	Statistically significant, lower risk associated with treatment group, difference decreases over time	Statistically significant, lower risk associated with treatment group, difference consistent over time
DUI incidents	No statistical difference	Statistically significant, lower risk associated with comparison group, difference consistent over time	Statistically significant, lower risk associated with comparison group, difference consistent over time	Statistically significant, lower risk associated with treatment group, difference decreases over time	Statistically significant, lower risk associated with treatment group, difference decreases over time	Statistically significant, lower risk associated with treatment group, difference consistent over time
Crashes	Statistically significant, lower risk associated with comparison group, difference consistent over time	No statistical difference	No statistical difference	Statistically significant, lower risk associated with comparison group, difference increases over time	Statistically significant, lower risk associated with comparison group, difference increases over time	Statistically significant, lower risk associated with comparison group, difference consistent over time

For second DUI offenders, the AB 91 intent-to-treat evaluation findings show that offenders in the non-pilot counties have a lower risk of a subsequent DUI conviction or DUI incident than offenders in the the AB 91 pilot counties. This difference among the two groups is consistent over time. In addition, there are no differences in the risk of a subsequent crash for second DUI offenders in the pilot counties versus those in the non-pilot counties.

There are no differences between third and subsequent DUI offenders from AB 91 pilot counties and those from non-pilot counties in their risk of a subsequent DUI conviction and crash involvement based on the AB 91 intent-to-treat evaluation results. Still, the AB 91 pilot program is negatively associated with the risk of a subsequent DUI incident among third and subsequent DUI offenders. Specifically, the third and subsequent DUI offenders from non-pilot counties have a lower risk of a subsequent DUI incident than the third and subsequent DUI offenders from the pilot counties, and this difference is consistent over time.

According to the results from the AB 91 IID/restricted license evaluation, all three DUI offender groups (first, second, and third and subsequent) whose qualifying DUI offense occurred in one of the pilot counties, and who obtained an IID-restricted license satisfying all AB 91 pilot program restriction/reinstatement requirements, have lower DUI recidivism risk than their matched DUI offender comparison groups consisting of offenders that remained suspended or revoked during the study time period. First and second DUI offender groups with an AB 91 IID-restricted/reinstated driver license have lower risk of a subsequent DUI conviction and DUI incident than their corresponding groups of suspended DUI offenders. However, the lower DUI recidivism risk associated with both IID-restricted first and second DUI offender groups decreases over time. Specifically, the results suggest that during the period in which DUI offenders likely become eligible for IID device removal from their vehicle, the difference between the first and second DUI offender IID-restricted and suspended comparison groups on the odds or hazards of a subsequent DUI conviction/incident begin to diminish. Most noteworthy is the finding that by the end of the study period, these differences continue to diminish among first DUI offenders and are not statistically significant among second DUI offenders.

The AB 91 IID/restricted license evaluation results for the subsequent crash outcomes indicate findings opposite to those for the subsequent DUI conviction/incident for all three DUI offender groups. That is, the first, second, and third and subsequent DUI offender groups with an AB 91 IID-restricted/reinstated driver license have a higher subsequent crash risk than their matched groups of suspended/revoked drivers. While this difference in the crash risk between IID-

restricted and suspended/revoked comparison groups remains constant among third and subsequent DUI offenders, it increases over time among first and second DUI offender groups. More importantly, the extended Cox regression interaction models in relation to the crash criterion show that for first and second offenders, during the period in which both the treatment and comparison groups are likely under a license suspension/revocation, the odds or hazards of crashing do not significantly differ. However, when the treatment group becomes eligible to receive an IID-restricted license, the treatment group begins to crash at a quicker rate. The associated odds or hazards of a crash continue to increase over time relative to the comparison group who remain on a suspended/revoked license.

Conclusion

The findings of the specific deterrence evaluation of the AB 91 pilot program indicated that there were either no differences in subsequent DUI recidivism and crash involvement of DUI offenders in the AB 91 pilot counties relative to those in the non-pilot counties or that some groups of DUI offenders from non-pilot counties have lower risk of a subsequent DUI recidivism and crash involvement relative to those in the pilot counties. Further, the findings of the current study show that IIDs can be associated with reduced subsequent DUI recidivism among specific DUI offender groups, but with a substantial increase in subsequent crashes among DUI offenders who installed an IID relative to suspended or revoked DUI offenders. It bears emphasizing that the current study found a strong and reliable association between possession of an AB 91 IID-restricted license and reduced DUI recidivism. Across all DUI offender levels, those with an IID-restricted license have lower odds or hazards of a subsequent DUI conviction, and lower odds or hazards of a subsequent DUI incident when compared to drivers with suspended or revoked licenses. For first DUI offenders these differences tend to diminish with time. For second offenders these differences disappear after approximately 2 years. For third and subsequent DUI offenders the difference in subsequent DUI recidivism did not diminish over the 42-month follow-up period.

These study findings are generally consistent with those reported by DeYoung et al. (2005) and with other prior Departmental research showing driver license suspensions and revocations to be the most effective available countermeasure in reducing crash involvement (Gebers, 2009; Hagen, 1977; Rogers, 1995, 1997; Tashima & Marelich, 1989; Tashima & Peck, 1986).

The DeYoung et al. (2005) study and the current study used similar methodological and analytical techniques and obtained comparable results. However, the current study is more

comprehensive, and its findings are unique in regards to the effectiveness of IID programs among current California DUI offenders. For example, the 2005 study only evaluated the effect of an IID court order or restriction among first DUI offenders with elevated BAC levels and found no association between an IID court order and reductions in subsequent DUI recidivism and crashes. The current study involved all first DUI offenders and provided additional evidence about the potential effects of IID-restricted licenses among first DUI offenders. Thus, although the 2005 study indicated little or no effect of an IID court order or restriction among first DUI offenders, the current study found a reliable association between possession of an AB 91 IID-restricted license and reduced DUI recidivism among first DUI offenders. Furthermore, the current study results supported the 2005 study findings that IIDs are associated with reduced DUI recidivism among second DUI offenders. While the 2005 study only found significantly lower DUI recidivism when the occurrence of subsequent DUI incidents was used as the outcome measure, the current study found lower DUI recidivism among AB 91 IID-restricted second DUI offenders for both DUI recidivism outcome measures (subsequent DUI convictions and DUI incidents). Similar findings were reported for the third and subsequent DUI offender AB 91 IID/restricted license evaluation, which was not an evaluation component of the 2005 study. However, the positive association between the AB 91 IID-restricted license and lower DUI recidivism decreases over time and eventually reveals no reliable (statistically significant) difference among second DUI offenders.

The positive associations between the AB 91 IID-restricted license and lower DUI recidivism among all DUI offender groups and its diminishing effects over time for some DUI offenders found in the current study agree with overall findings from other research studies focused on the effectiveness of IIDs. Specifically, other studies have also found that first and repeat DUI offenders with IIDs installed in their vehicles have substantially lower DUI recidivism rates than corresponding DUI offender groups whose driver licenses are suspended. Similar to the current study findings, this positive effect vanishes once IIDs are removed from the offenders' vehicles (Elder et al., 2011; Roth, Voas, & Marques, 2007). Comparable results were reported by Voas et al. (2013) when DUI offenders installed interlock devices through both optional IID programs and mandatory IID programs, some of which, like the AB 91 pilot program, use the IID installment as a condition for full license reinstatement. However, because the overall structure and implementation specifics of IID programs vary among states, it is problematic to generalize the findings on the effectiveness of an IID program from state to state.

Most research studies on IID programs focus on DUI recidivism as the sole measure of the program effectiveness. The common rationale for not using crashes is that crashes are rare events

and not easy to use as an outcome measure in evaluation studies. Occasionally, researchers use specific surrogate measures for alcohol-related crashes such as single-vehicle late-night crashes (interestingly, an even more rare event than the number of total reported crashes, a fact that seems to be ignored by researchers using this criterion). For example, a recent evaluation of Washington State's 2003 and 2004 IID laws affecting first DUI offenders (McCartt et al., 2013) used single-vehicle late-night crash risk as a surrogate measure for alcohol-related crashes and found a modest but significant 8% reduction in single-vehicle late-night crash risk associated with one of the two Washington IID laws.

One of the main contributions of the current study is that this IID pilot program evaluation, in addition to DUI recidivism, used crashes as the outcome measure.[24] The necessity of using the crash outcome measure in IID evaluations is acknowledged in peer reviewed literature (Voas & Lacey, 2011). A smaller number of studies that used crashes as the outcome measure evaluating IID program effectiveness reported that drivers who participated in IID program had increased overall crash risk relative to drivers with a suspended license (Elder et al., 2011). Similar findings are reported in the study by DeYoung et al. (2005), which is often cited as one of the few studies where crashes were used as the outcome measure.

Both the current and the 2005 studies reported a negative association between IID-restricted license and subsequent crash involvement among second DUI offenders. That is, a higher crash risk was evident among second DUI offenders who obtained an IID-restricted license. In addition, the current study found the same results for all DUI offender groups (first, second, third and subsequent). Even more problematic is the finding that for the first and second DUI offenders the higher crash risk associated with the IID-restricted drivers increases over time relative to those with suspended license. Therefore, although the AB 91 IID program is associated with significant reduction in DUI recidivism among all IID-restricted DUI offender groups, the program is also associated with increase in crash involvement among all DUI offenders that are subject to the program and those who obtained an IID-restricted license. This is particularly problematic since a substantial proportion of these crashes are those involving injuries and/or fatalities (of the overall crash involvement measured in the study, the proportion of fatal/injury crashes ranged from mid-30% to low-40% for different DUI offender groups).

[24] While the present study appropriately focused on total reported crashes, all analyses conducted during the dataset creation and screening processes and the preliminary analyses were consistent in that when significant differences occurred on total crashes, the effects were pervasive across crash severity and sub-types as well (e.g., fatal/injury, HBD, responsible). Such consistency is expected when, as reported in the prior sections, the treatment/comparison groups are well balanced and equivalent prior to conducting the outcome analyses and when no reporting bias on casualty crashes is present between groups.

The crash outcome findings of the current study are of primary importance since traffic crashes and costs associated with the resulting injuries, fatalities, and property damage are a direct and decisive measure of the traffic safety effects of a given program. As noted by Janke and Peck (1991) "*only the accident measure has the potential for substantiating the traffic safety value of a program or determining the accident propensity of a driver group*". The authors continued to emphasize that when "*evaluating effects of programs on traffic safety from a public health perspective, there is simply no viable substitute for this measure"* (p.13). Consequently, given that the AB 91 pilot program is associated with an increase in crash risk among DUI offenders who complied with AB 91 program requirements and obtained an IID-restricted license when compared to drivers with a suspended or revoked license, the traffic safety benefits of this program are potentially marginalized by the greater safety toll of an increased propensity for traffic crash involvement.

McCartt et al. (2013) argued that focusing on DUI recidivism as the outcome measure is justified. The authors relied on a finding by Fell (1993; as cited in McCartt et al., 2013) which indicated that drivers with prior convictions for alcohol-impaired driving are overrepresented in fatal crashes. Therefore, McCartt concluded, reducing recidivism among those "convicted of alcohol-impaired driving could potentially reduce alcohol-related fatalities." While this assumption seems plausible, it is critical not to ignore a potential risk associated with drivers who do not have prior convictions for alcohol-impaired driving. Specifically, most alcohol- and drug-involved drivers in fatal crashes in California do not have prior DUI convictions on their driver record (Oulad Daoud et al., 2015). Therefore, going beyond DUI recidivism and, first and foremost, including crashes as a direct measure of the traffic safety effects of a given IID program undoubtedly, strengthens an evaluation of such programs in determining whether they can be associated with a lower risk of crashes and ultimately with reduced fatalities and/or injuries.

The analytical approach taken in this study rests in part on a basic assumption that the state's interest in reducing the number of DUI incidents ultimately derives from the demonstrated fact that impaired driving is intimately tied to a huge toll in economic costs and human suffering. In short, any hoped-for reduction in the number of DUI incidents is assumed to be a means to an end—the preservation of life and health among the users of our roads—and never exactly an end in itself. Similarly, any hoped-for reduction in DUI recidivism is assumed to be a means to reduce the public-health threat impaired drivers pose to themselves and others in terms of traffic crash involvement.

Due to the quasi-experimental nature of this evaluation that was necessitated for this evaluation of the AB 91 IID pilot program, it cannot be scientifically predicted what the expected reduction in DUI recidivism (2nd, 3rd, etc., DUI convictions and DUI incidents) would be more broadly implemented. That number is certainly greater than zero, and could be in the thousands. By the same token, it also cannot be precisely predicted what the expected increase in crashes, including fatal/injury crashes, would be were this AB 91 IID pilot program to be with a broader implementation. That number is certainly greater than zero, and could be in the hundreds.

Consistent with the recommendations from DeYoung et al. (2005), the IID requirement should continue to be evaluated as a potential DUI countermeasure in California. For example, driver license suspension or revocation actions could be combined with IID requirements, as these two countermeasures may help reduce alcohol-related incidents in different ways. The effectiveness of driver license suspension has been documented in numerous prior California studies since the late 1970s both as an overall traffic safety countermeasure and as, most relevant in this context, a DUI countermeasure (Hagen, 1977; Tashima & Peck, 1986; Tashima & Marelich, 1989; Rogers, 1995, 1997; Gebers, 2009).

The importance of sustained use of hard license suspension or revocation actions as a DUI countermeasure is particularly relevant in regards to APS suspension or revocation actions. Namely, prior research has shown that APS license suspensions or revocations have statistically significant and substantially important effects in reducing alcohol-related fatal crash involvement (Wagenaar & Maldonado-Molina, 2007; Rogers, 1995, 1997). In her two studies, Rogers has shown that California's APS law from 1990 have both general (1995) and specific (1997) deterrent effects. Specifically, because of their swiftness and certainty of punishment (immediately upon DUI arrest), APS suspension and revocation actions are very well in sync with the main deterrence theory postulates (Ross, 1982) and continued requirement for hard license suspension or revocation for a pre-specified minimum time period, as prescribed under California's APS law, should be preserved.

Overall, driver license actions should continue to be an integral part of the DUI countermeasure system in California. As Helander (2002) noted in the past legislatively-mandated review of scientific evidence on effective DUI countermeasures, driver license suspensions are among the most proven-effective DUI countermeasures whose integrity should be maintained. He further argued that new DUI laws and programs should “not diminish or work at cross-purposes to laws and programs that are effective . . .” (p. 27) as are license suspension/revocation actions. DeYoung (2013) also reasoned that, in addition to being effective traffic safety countermeasures,

driver license suspension and revocation actions are inexpensive and relatively easy to administer.

The results presented in the current study support the observation by DeYoung (2013) as to why mitigating the overall traffic risk of DUI offenders through a significant period of hard license suspension is an appropriate system goal. DeYoung offered two such reasons. He stated:

> The first is that license suspension fits the crime; the system responds to the irresponsible combination of driving and drinking that threatens the safety of other road users by removing the driving privilege. The second reason is that the bottom line in traffic safety is to reduce motor vehicle crashes, which take a huge societal toll in economic costs and human suffering; reducing their incidence should be a high priority and license suspension does this. Finally, a substantial proportion of DUI offenders are risky not just because they drink and drive, but also because they are problem drivers regardless of whether they have been drinking. (DeYoung, 2013, p. 50)

For example, using the multivariate statistical technique of cluster analysis, a California study by Arstein-Kerslake and Peck (1985), reported two dimensions among which DUI offenders can be distinguished. One dimension represented problem drinking and the other represented problem driving. On the basis of the results presented in Arstein-Kerslake and Peck, the authors of the present study believe that the current results support the view that IIDs can assist in reducing problem drinking while driving. However, the use of license suspension or revocation is effective in reducing both of these dimensions by demonstratively deterring impaired drivers who have been apprehended and also by deterring potential alcohol-impaired drivers from driving impaired in the first place. The results in the present report show that when an IID-restricted license supplants the use of license suspension or revocation, there is an associated increase in total crashes in general and fatal/injury crashes in particular. These findings are further supported by DeYoung (2013), who noted that it is clear that some DUI offenders represent a risk on the roads beyond just driving impaired; suggesting that using license suspension to mitigate traffic safety risk should be an important DUI countermeasure goal. That is, license suspension works to control the overall traffic safety risk of first- and repeat-DUI offenders, and when used administratively reduces alcohol-involved incidents as well.

One promising solution that addresses a need to preserve the use of suspensions and revocations and combines it with ignition interlock is the IID program legislated under SB 598 (Statutes of 2009, Chapter 193, Huff – see Appendix E). This law offers an incentive for alcohol-only second

and third misdemeanor DUI offenders to shorten their required suspension/revocation period provided they install an IID. Consequently, SB 598 offers potentially optimal use of both licensing actions and IID countermeasures, and, therefore, the effectiveness of this particular law should be evaluated. In addition, SB 598 potentially addresses obvious shortcomings of AB 91 and other existing IID programs in the state. Specifically, the IID program under SB 598 law "recognizes" that IIDs prevent drivers from driving under the influence of alcohol and have no value in preventing them from driving under the influence of drugs. Although SB 598 law shortens required suspension or revocation period for eligible DUI offenders, it does not completely eliminate licensing actions. Thus, instead of being completely eliminated, driver license suspension or revocation actions could be combined with IID requirements as these two measures may help reduce alcohol-related incidents in different ways. However, before these two countermeasures are combined, it needs to be determined what are the most appropriate or optimal periods of hard license suspension or revocation that different types of DUI offenders need to serve prior to obtaining an IID-restricted license. As DeYoung (2013) emphasized, shortening license suspension too drastically might result in eliminating significant general deterrent effect of license suspension, a move which compromises overall traffic safety.

DUI offenders in California are currently subject to a combination of various sanctions, penalties, and interventions relative to their DUI offender status and aimed at preventing them from future impaired driving and crash-involved episodes. The effectiveness of each of these sanctions and penalties varies depending on different circumstances such as whether they are implemented alone or in combination with others. There is a tendency over time to add new requirements or introduce new programs that DUI offenders must comply with in order to relicense. However, as DeYoung argued in his recent paper (2013), continuing to add new requirements may result in discouraging DUI offenders altogether from complying with all conditions to reinstate their driving privilege and indirectly forcing them out of reach of the post-licensing control system. Therefore, before a new requirement is added to the already complicated set of DUI countermeasures in California, any such new requirements must demonstrate "convincing traffic safety benefits" (DeYoung, 2013).

Recommendations

The results of the analyses presented in this report clearly show that the IID-restricted license program, as implemented in the 4-county pilot authorized under AB 91, has mixed traffic safety impacts. There is strong evidence of a reduction in DUI recidivism, across all offender levels, among those obtaining an IID-restricted license under the provisions of this law. However, there

is also strong evidence of a consistent increase in crashes, including fatal/injury crashes, among these same drivers. The state has a compelling interest in reducing the toll of motor vehicle-related injuries and fatalities. This interest is expressed in the state's commitment to the Strategic Highway Safety Plan and is in keeping with associated federal laws and regulations, such as MAP-21 ("Moving Ahead for Progress in the 21st Century," P.L. 112-141). Although the reduction in DUI recidivism provides evidence of benefits associated with IID restrictions, the increased crash risks associated with the AB 91 pilot program suggest that additional investigation and research could be beneficial. Inclusion of information regarding crash responsibility (i.e. at-fault/not-at-fault), alcohol involvement, or severity level (i.e. fatal/injury crashes vs property-damage only crashes) may provide further insight. The following recommendations are therefore offered based on the findings of this study.

1. The Department should implement its planned evaluation of SB 598. An evaluation of the traffic safety benefits of the IID program legislated under this law is important because it will determine how effective is the shortening of the proven-effective countermeasure of a hard license suspension or revocation period among qualifying DUI offenders when offered the option of an IID-restricted license. If found effective, SB 598 could be adopted and/or incorporated into a new comprehensive IID program for drivers convicted of alcohol-related DUI offenses.

2. The Department should conduct and report to the Legislature a quantitative evaluation of prior California studies focusing on the efficacy of DUI countermeasures already in place in California. This report would offer recommendations for legislative reform as to which existing countermeasures are more effective and should be retained and/or expanded and which countermeasures are currently less effective and therefore should be revised and strengthened. Such an effort would involve the application of a meta-analytical technique focusing on potential topical areas such as (1) driver-based countermeasures (e.g., minimum-age drinking laws, APS laws, lower per se BAC for repeat offenders, public information and education); (2) vehicle-based countermeasures (e.g., IID, vehicle impoundment); and (3) other countermeasures that have an impact on alcohol-impaired driving (e.g., DUI Court and alcohol beverage control). The results will assist lawmakers and traffic safety administrators in proposing and implementing DUI countermeasures that are potentially effective and, therefore, reduce the risk of unintended consequences such as increased crash risk.

3. The Department should work with representatives from the courts, law enforcement, and other involved entities, through the Strategic Highway Safety Plan (SHSP) process or otherwise, to explore options for the use of IIDs as a potentially effective DUI countermeasure. Specifically, there are some recent attempts in California (such as in San Joaquin County) that include using IIDs as an "alcohol-abstinence-compliance" monitoring tool, as part of a modified version of the traditional DUI court model. In addition to IID use, this DUI court model encompasses the use of an alcohol detection ankle bracelet for two different levels of court supervision and treatment monitoring of convicted repeat DUI offenders. This approach offers potentially promising results; further investment and exploration of this or similar efforts may result in empirical evidence to support the effective use of IIDs as a DUI and traffic safety countermeasure.

4. The Department should convene a task force, including representatives from the judiciary, law enforcement, and other public or private agencies whose work includes oversight, administration, or enforcement of various aspects of the DUI countermeasure system. The purpose of this task force would be to develop recommendations for further actions (including potential model legislation), for strengthening components of California's comprehensive DUI countermeasure system (e.g., IIDs, suspension and revocation actions, DUI courts, vehicle impoundment, DUI treatment program, etc.). These recommendations for further actions may be based on the information gathered as part of recommendations #1, #2, and #3 (above), and other research findings or policy considerations where appropriate.

REFERENCES

Allison, P. D. (1995). *Survival analysis using SAS, a practical guide*. Cary, NC: SAS Institute Inc.

Arstein-Kerslake, G. W., & Peck, R. C. (1985). *A typological analysis of California DUI offenders and DUI recidivism correlates* (Report No. 100). Sacramento, CA: California Department of Motor Vehicles.

Ata, N., & Sozer, M. T. (2007). Cox regression models with nonproportional hazards applied to lung cancer data. *Hacettepe Journal of Mathematics and Statistics*, *36*(2), 157-167.

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental design for research*. Chicago, IL: Rand McNally College Publishing Company.

Chapman, E. A., Oulad Daoud, S., & Masten, S. V. (2015). *General deterrent evaluation of ignition interlock pilot program in California* (Report No. 247). Sacramento, CA: California Department of Motor Vehicles.

DeYoung, D. J. (2013). Traffic safety impact of judicial and administrative driver license suspension. *Transportation Research Circular*, *E-C174*, 41–53.

DeYoung, D. J., Tashima, H. N., & Masten, S. V. (2005). *An evaluation of the effectiveness of ignition interlock in California: Technical report* (Report No. 217). Sacramento, CA: California Department of Motor Vehicles.

Elder, R. W., Voas, R., Beirness, D., Shults, R. A., Sleet, D. A., Nichols, J. L., . . . Task Force on Community Preventive Services. (2011). Effectiveness of ignition interlocks for preventing alcohol-impaired driving and alcohol-related crashes: A community guide systematic review. *American Journal of Preventive Medicine, 40*(3), 362-376.

EMT Group. (1990). *Evaluation of the California ignition interlock pilot program for DUI offenders, final report*. Sacramento, CA: Author

Friedman, H. S., & Thurman, P. W. (2012). *Propensity score matching, adjustment, and randomized experiments course notes*. Cary, NC: SAS Institute Inc.

Fulkerson, A. (2003). The ignition interlock system: An evidentiary tool becomes a sentencing element. *Court review, Winter 2003*, 18-22. Retrieved October 14, 2014, from http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1125&context=ajacourtreview

Gebers, M. A. (2009). *Enhanced Negligent Operator Treatment Evaluation System program effectiveness report #1 (Summary of findings)* (Report No. 230). Sacramento, CA: California Department of Motor Vehicles.

Gebers, M. A., & Roberts, R. A. (2004). *Characteristics of negligent operators in California* (Report No. 209). Sacramento, CA: California Department of Motor Vehicles.

Hagen, R. E. (1977). *The effectiveness of license suspension or revocation for drivers convicted of multiple driving-under-the-influence offenses* (Report No. 59). Sacramento, CA: California Department of Motor Vehicles.

Helander, C. J. (2002). *DUI countermeasures in California: What works and what doesn't, with recommendations for legislative reform* (Report No. 197). Sacramento, CA: California Department of Motor Vehicles.

Hosmer, D. W., & Lemeshow, S. (1999). *Applied survival analysis*. New York, NY: John Wiley & Sons, Inc.

Janke, M., & Peck R. C. (1991). *Accident reporting: Is there a problem?* Unpublished report. Sacramento, CA: California Department of Motor Vehicles.

Kirk, R. E. (1968). *Experimental design: Procedures for the behavioral sciences*. Belmont, CA: Wadsworth Publishing Company, Inc.

Marques, P. R., Voas, R. B., Roth, R., & Tippetts, A. S. (2010). *Evaluation of the New Mexico ignition interlock program* (Report No. DOT HS 811 410). Washington, DC: National Highway Traffic Safety Administration.

McCartt, A. T., Leaf, W. A., Farmer, C. M., & Eichelberger, A. H. (2013). Washington State's alcohol ignition interlock law: Effects on recidivism among first-time DUI offenders. *Traffic Injury Prevention, 14*, 215–229.

Oulad Daoud, S., Tashima, H. N., & Grippe, R. (2015). *Annual report of the California DUI management information system. Annual report to the Legislature of the State of California* (Report No. 250). Sacramento, CA: California Department of Motor Vehicles.

Patetta, M. (2006). *Survival analysis using the proportional hazards model course notes*. Cary, NC: SAS Institute Inc.

Rogers, P. N. (1995). *The general deterrent impact of California's 0.08% blood alcohol concentration limit and administrative per se license suspension laws, Volume 1* (Report No. 158). Sacramento, CA: California Department of Motor Vehicles.

Rogers, P. N. (1997). *The specific deterrent impact of California's 0.08% blood alcohol concentration limit and administrative per se license suspension laws*, *Volume 2* (Report No. 167). Sacramento, CA: California Department of Motor Vehicles.

Ross, H. L. (1982). *Deterring the drinking driver.* Lexington, MA: Lexington Books.

Rosenbaum, P. R., & Rubin, D. R. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *The American Statistician*, *39*(1), 33-38.

Roth, R., Voas, R. B., & Marques, P. R. (2007). Interlocks for first offenders: effective? *Traffic Injury Prevention, 8*, 346-352.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ED.). Needham Heights, MA: Allyn & Bacon.

Tashima, H. N., & Helander, C. J. (2005). *Annual report of the California DUI management information system. Annual report to the Legislature of the State of California* (Report No. 211). Sacramento, CA: California Department of Motor Vehicles.

Tashima, H. N., & Marelich, W. D. (1989). *A comparison of the relative effectiveness of alternative sanctions for DUI offenders* (Report No. 122). Sacramento, CA: California Department of Motor Vehicles.

Tashima, H. N., & Peck, R. C. (1986). *An evaluation of the specific deterrent effects of alternative sanctions for first and repeat DUI offenders* (Report No. 95). Sacramento, CA: California Department of Motor Vehicles.

United States Government Accountability Office (2014). *Report to the chairman, committee on commerce, science, and transportation, U. S. Senate. Alcohol ignition interlocks are effective while installed; Less is known how to increase installation rates* (GAO-14-559). Retrieved September 8, 2014, from http://www.gao.gov/assets/670/664281.pdf

Voas, R. B., & Lacey, J. C. (2011). *Alcohol and Highway Safety 2006: A Review of the State of Knowledge* (Report No. DOT HS 811 374). Washington, DC: National Highway Traffic Safety Administration.

Voas, R. B., Tippetts, A. S., & Grosz, M. (2013). Administrative reinstatements interlock programs: Florida, a 10-year study. *Alcoholism, Clinical & Experimental Research, 37*(7), 1243–1251.

Wagenaar, A. C., & Maldonado-Molina, M. M. (2007). Effects of drivers' license suspension policies on alcohol-related crash involvement: Long-term follow-up in forty-six states. *Alcoholism: Clinical and Experimental Research, 31*(8), 1399-1406.

APPENDICES

APPENDIX A

Assembly Bill No. 91

CHAPTER 217

An act to amend Sections 13386 and 23576 of, and to add and repeal Chapter 5 (commencing with Section 23700) of Division 11.5 of, the Vehicle Code, relating to vehicles.

[Approved by Governor October 11, 2009. Filed with Secretary of State October 11, 2009.]

LEGISLATIVE COUNSEL'S DIGEST

AB 91, Feuer. Vehicles: driving under the influence (DUI): ignition interlock device.

(1) Existing law requires all manufacturers of ignition interlock devices that meet specified requirements and are certified in a manner approved by the Department of Motor Vehicles, that intend to market the devices in this state, to first apply to the department on forms provided by the department and to pay an accompanying fee in an amount not to exceed the amount necessary to cover the costs incurred by the department in carrying out those provisions.

This bill would require a manufacturer and a manufacturer's agent, certified by the department to provide ignition interlock devices, to provide each year to the department information on the number of false positives and the time to reset the device. The bill would also require the department to use this information in evaluating the continued certification of an ignition interlock device.

(2) Existing law requires a person's privilege to operate a motor vehicle to be suspended or revoked for a specified period of time if the person has been convicted of violating specified provisions prohibiting driving a motor vehicle while under the influence of an alcoholic beverage or drug or the combined influence of an alcoholic beverage and drug, or with 0.08% or more, by weight, of alcohol in his or her blood or while addicted to the use of any drug, with or without bodily injury to another. Existing law also authorizes a person whose privilege is suspended or revoked in that manner to receive a restricted driver's license if specified requirements are met, including, in some instances, the installation of an ignition interlock device on the person's vehicle.

This bill would require the department to establish a pilot program from July 1, 2010, to January 1, 2016, in the Counties of Alameda, Los Angeles, Sacramento, and Tulare that requires, as a condition of being issued a restricted driver's license, being reissued a driver's license, or having the privilege to operate a motor vehicle reinstated subsequent to a conviction for a violation of the above offenses, a person to install for a specified period of time an ignition interlock device on all vehicles he or she owns or operates, except as provided. The amount of time the ignition interlock device would be required to be installed would be based upon the number

of convictions, as prescribed. The bill would prohibit the implementation of the pilot program if the department fails to obtain, by January 31, 2010, nonstate funds for the programming costs of the pilot program. The bill would set up a statutory scheme under which the department would, with regard to the installation of an ignition interlock device described above, notify the person of the ignition interlock device installation requirements established under the bill, accept notification from the installer of the ignition interlock device of attempts to remove, bypass, or tamper with the ignition interlock device or if the person fails 3 or more times to comply with the maintenance requirements, monitor the installation and maintenance of the ignition interlock device, and keep specified records. The bill would also require that manufacturers and manufacturer's agents, certified by the department to provide ignition interlock devices, adopt a fee schedule for payment of the costs of the ignition interlock device based on the offender's ability to pay, and would require the court to adopt a similar fee schedule with regard to the fees for the county alcohol and drug problem assessment program.

On or before January 1, 2015, the department would be required to report to the Legislature regarding the effectiveness of the pilot program in reducing the number of first-time driving under the influence violations and repeat offenses in those counties.

(3) This bill would require that it become operative only if SB 598 of the 2009–10 Regular Session becomes operative on or before January 1, 2010.

(4) Because it is a crime to operate a vehicle that is not equipped with a functioning, certified ignition interlock device by a person whose driving privilege is so restricted, the bill would impose a state-mandated local program by expanding the scope of that crime.

(5) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement. This bill would provide that no reimbursement is required by this act for a specified reason.

The people of the State of California do enact as follows:

SECTION 1. Section 13386 of the Vehicle Code is amended to read: 13386. (a) (1) The Department of Motor Vehicles shall certify or cause to be certified ignition interlock devices required by Article 5 (commencing with Section 23575) of Chapter 2 of Division 11.5 and publish a list of approved devices.

(2) (A) The Department of Motor Vehicles shall ensure that ignition interlock devices that have been certified according to the requirements of this section continue to meet certification requirements. The department may periodically require manufacturers to indicate in writing whether the devices continue to meet certification requirements.

(B) The department may use denial of certification, suspension or revocation of certification, or decertification of an ignition interlock device in another state as an indication that the certification requirements are not met, if either of the following apply:

(i) The denial of certification, suspension or revocation of certification, or decertification in another state constitutes a violation by the manufacturer of Article 2.55 (commencing with Section 125.00) of Chapter 1 of Division 1 of the Title 13 of the California Code of Regulations.

(ii) The denial of certification for an ignition interlock device in another state was due to a failure of an ignition interlock device to meet the standards adopted by the regulation set forth in clause (i), specifically Sections 1 and 2 of the model specification for breath alcohol ignition interlock devices, as published by notice in the Federal Register, Vol. 57, No. 67, Tuesday, April 7, 1992, on pages 11774 to 11787, inclusive.

(C) Failure to continue to meet certification requirements shall result in suspension or revocation of certification of ignition interlock devices.

(b) (1) A manufacturer shall not furnish an installer, service center, technician, or consumer with technology or information that allows a device to be used in a manner that is contrary to the purpose for which it is certified. (2) Upon a violation of paragraph (1), the department shall suspend or revoke the certification of the ignition interlock device that is the subject of that violation.

(c) An installer, service center, or technician shall not tamper with, change, or alter the functionality of the device from its certified criteria.

(d) The department shall utilize information from an independent laboratory to certify ignition interlock devices on or off the premises of the manufacturer or manufacturer's agent, in accordance with the guidelines. The cost of certification shall be borne by the manufacturers of ignition interlock devices. If the certification of a device is suspended or revoked, the manufacturer of the device shall be responsible for, and shall bear the cost of, the removal of the device and the replacement of a certified device of the manufacturer or another manufacturer.

(e) No model of ignition interlock device shall be certified unless it meets the accuracy requirements and specifications provided in the guidelines adopted by the National Highway Traffic Safety Administration.

(f) All manufacturers of ignition interlock devices that meet the requirements of subdivision (e) and are certified in a manner approved by the Department of Motor Vehicles, who intend to market the devices in this state, first shall apply to the Department of Motor Vehicles on forms provided by that department. The application shall be accompanied by a fee in an amount not to exceed the amount necessary to cover the costs incurred by the department in carrying out this section.

(g) A manufacturer and a manufacturer's agent certified by the department to provide ignition interlock devices shall provide each year to the department information on the number of false positives and the time to reset the device. The department shall use this information in evaluating the continued certification of an ignition interlock device.

(h) The department shall ensure that standard forms and procedures are developed for documenting decisions and compliance and communicating results to relevant agencies. These forms shall include all of the following:

(1) An "Option to Install," to be sent by the Department of Motor Vehicles to repeat offenders along with the mandatory order of suspension or revocation. This shall include the alternatives available for early license reinstatement with the installation of an ignition interlock device and shall be accompanied by a toll-free telephone number for each manufacturer of a certified ignition interlock device. Information regarding approved installation locations shall be provided to drivers by manufacturers with ignition interlock devices that have been certified in accordance with this section.

(2) A "Verification of Installation" to be returned to the department by the reinstating offender upon application for reinstatement. Copies shall be provided for the manufacturer or the manufacturer's agent.

(3) A "Notice of Noncompliance" and procedures to ensure continued use of the ignition interlock device during the restriction period and to ensure compliance with maintenance requirements. The maintenance period shall be standardized at 60 days to maximize monitoring checks for equipment tampering.

(i) Every manufacturer and manufacturer's agent certified by the department to provide ignition interlock devices shall adopt fee schedules that provide for the payment of the costs of the device by applicants in amounts commensurate with the applicant's ability to pay.

SEC. 2. Section 23576 of the Vehicle Code is amended to read:

23576. (a) Notwithstanding Sections 23575 and 23700, if a person is required to operate a motor vehicle in the course and scope of his or her employment and if the vehicle is owned by the employer, the person may operate that vehicle without installation of an approved ignition interlock device if the employer has been notified by the person that the person's driving privilege has been restricted pursuant to Sections 23575 and 23700 and if the person has proof of that notification in his or her possession, or if the notice, or a facsimile copy thereof, is with the vehicle.

(b) A motor vehicle owned by a business entity that is all or partly owned or controlled by a person otherwise subject to Sections 23575 and 23700, is not a motor vehicle owned by the employer subject to the exemption in subdivision (a).

SEC. 3. Chapter 5 (commencing with Section 23700) is added to Division 11.5 of the Vehicle Code, to read:

Chapter 5. Ignition Interlock Devices

23700. (a) Notwithstanding any other provision of law, the Department of Motor Vehicles shall establish a pilot program in the Counties of Alameda, Los Angeles, Sacramento, and Tulare to reduce the number of first-time violations and repeat offenses of Sections 23152 and 23153, as follows:

(1) The Department of Motor Vehicles, upon receipt of the court's abstract conviction for a violation listed in paragraph (7), shall inform the convicted person of the requirements of this section, including the term for which the person is required to have a certified ignition interlock device installed. The records of the department shall reflect the mandatory use of the device for the term required and the time when the device is required to be installed by this code.

(2) The department shall advise the person that installation of an ignition interlock device on a vehicle does not allow the person to drive without a valid driver's license.

(3) Before a driver's license may be issued, reissued, or returned to a person after a suspension or revocation of that person's driving privilege that requires the installation of an ignition interlock device, a person who is notified by the department pursuant to paragraph (1) shall complete all of the following:

(A) Arrange for each vehicle owned or operated by the person to be fitted with an ignition interlock device by a certified ignition interlock device provider under Section 13386.

(B) Notify the department and provide to the department proof of installation by submitting the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(C) Pay the fee, determined by the department, that is sufficient to cover the costs of administration of this section.

(4) The department shall place a restriction on the driver's license record of the convicted person that states the driver is restricted to driving only vehicles equipped with a certified ignition interlock device.

(5) (A) A person who is notified by the department pursuant to paragraph

(1) shall arrange for each vehicle with an ignition interlock device to be serviced by the installer at least once every 60 days in order for the installer to recalibrate and monitor the operation of the device.

(B) The installer shall notify the department if the device is removed or indicates that the person has attempted to remove, bypass, or tamper with the device, or if the person fails three or more times to comply with any requirement for the maintenance or calibration of the ignition interlock device.

(6) The department shall monitor the installation and maintenance of the ignition interlock device installed pursuant to paragraph (1).

(7) A person is required to install an ignition interlock device for the applicable term as a condition of being issued a restricted driver's license, being reissued a driver's license, or having the privilege to operate a motor vehicle reinstated subsequent to a conviction for a violation or a suspension of a person's driver's license, as follows:

(A) A person convicted of a violation of Section 23152 shall be required to install an ignition interlock device, as follows:

(i) Upon a first offense, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of five months.

(ii) Upon a second offense, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 12 months.

(iii) Upon a third offense, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 24 months.

(iv) Upon a fourth offense or any subsequent violation, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 36 months.

(B) A person convicted of a violation of Section 23153 shall install an ignition interlock device, as follows:

(i) Upon a first offense, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 12 months.

(ii) Upon a second offense, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 24 months.

(iii) Upon a third offense, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 36 months.

(iv) Upon a fourth offense or any subsequent violation, the person shall install an ignition interlock device in all vehicles owned or operated by that person for a mandatory term of 48 months.

(C) The terms prescribed in this paragraph shall begin once a person has provided to the department proof of installation pursuant to paragraph (2) of subdivision (h) of Section 13386 and upon restoration of the driving privilege pursuant to Section 13352.

(8) A person who is notified by the department, pursuant to this subdivision, is exempt from the requirements of this subdivision if within 30 days of the notification, the person certifies to the department all of the following:

(A) The person does not own a vehicle.

(B) The person does not have access to a vehicle at his or her residence.

(C) The person no longer has access to the vehicle being driven by the person at the time he or she was arrested for a violation that subsequently resulted in a conviction for a violation listed in this subdivision.

(D) The person acknowledges that he or she is only allowed to drive a vehicle that is fitted with a functioning ignition interlock device.

(E) The person acknowledges that he or she is required to have a valid driver's license before he or she can drive.

(F) The person is subject to the requirements of this section when he or she purchases or has access to a vehicle.

(9) Subdivisions (j), (k), (m), (n), and (o) of Section 23575 apply to this section.

(10) If a person fails to comply with any of the requirements regarding ignition interlock devices, the mandatory term for which the ignition interlock device is required to be installed shall be reset by the department.

(b) (1) Every manufacturer and manufacturer's agent certified by the department to provide ignition interlock devices, under Section 13386, shall adopt the following fee schedule that provides for the payment of the costs of the ignition interlock device by offenders subject to this chapter in amounts commensurate with that person's income relative to the federal poverty level, as defined in Section 127400 of the Health and Safety Code:

(A) A person with an income at 100 percent of the federal poverty level and below is responsible for 10 percent of the cost of the ignition interlock device. The ignition interlock device provider is responsible for absorbing the cost of the ignition interlock device that is not paid by the person.

(B) A person with an income at 101 to 200 percent of the federal poverty level is responsible for 25 percent of the cost of the ignition interlock device. The ignition interlock device provider is responsible for absorbing the cost of the ignition interlock device that is not paid by the person.

(C) A person with an income at 201 to 300 percent of the federal poverty level is responsible for 50 percent of the cost of the ignition interlock device. The ignition interlock device provider is responsible for absorbing the cost of the ignition interlock device that is not paid by the person.

(D) All other offenders are responsible for 100 percent of the cost of the ignition interlock device.

(2) The cost of the ignition interlock device may only be raised annually equal to the Consumer Price Index.

(3) The offender's income may be verified by presentation of that person's current federal income tax return or three months of monthly income statements.

(c) This section does not permit a person to drive without a valid driver's license.

(d) The requirements of this section are in addition to any other requirements of law.

(e) For the purposes of this section, "vehicle" does not include a motorcycle until the state certifies an ignition interlock device that can be installed on a motorcycle. A person subject to an ignition interlock device restriction shall not operate a motorcycle for the duration of the ignition interlock device restriction period.

(f) This section shall become operative on July 1, 2010. 23700.5. The department shall not implement Section 23700 if, by January 31, 2010, the department fails to obtain nonstate funds for the programming costs of the pilot program specified in Section 23700. 23701. On or before January 1, 2015, the Department of Motor Vehicles shall report to the Legislature regarding the effectiveness of the pilot program authorized under this chapter in reducing the number of first-time violations and repeat offenses of Sections 23152 and 23153 in the Counties of Alameda, Los Angeles, Sacramento, and Tulare.

23702. This chapter shall remain in effect only until January 1, 2016, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2016, deletes or extends that date.

SEC. 4. This bill shall become operative only if Senate Bill 598 of the 2009–10 Regular Session is enacted and becomes operative on or before January 1, 2010.

SEC. 5. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

O

APPENDIX B

California State Transportation Agency

DEPARTMENT OF MOTOR VEHICLES

ORDER OF INSTALLMENT OF
AN IGNITION INTERLOCK DEVICE

VEHICLE CODE SECTION 23700 ESTABLISHES A PILOT PROGRAM THAT REQUIRES ALL DRIVING UNDER THE INFLUENCE (DUI) OFFENDERS CONVICTED IN ALAMEDA, LOS ANGELES, SACRAMENTO, AND TULARE COUNTY TO INSTALL AN IGNITION INTERLOCK DEVICE (IID) ON EACH VEHICLE THEY OWN OR OPERATE. YOU MUST INSTALL AND MAINTAIN THE IID FOR 05 MONTHS.

IF YOU DO NOT OWN A VEHICLE, YOU MAY QUALIFY FOR AN EXEMPTION. REFER TO THE ATTACHED EXEMPTION FOR IGNITION INTERLOCK DEVICE FORM (DL 4055B) FOR ADDITIONAL INFORMATION.

BEFORE A LICENSE CAN BE ISSUED, REISSUED, REINSTATED, OR RESTRICTED, YOU MUST MEET ALL REINSTATEMENT REQUIREMENTS; INSTALL AN IID AND SUBMIT A "DEPARTMENT OF MOTOR VEHICLES ORDERED VERIFICATION OF IGNITION INTERLOCK" FORM (DL 924) FOR EACH VEHICLE YOU OWN OR OPERATE, OR BE APPROVED BY THE DEPARTMENT FOR EXEMPTION FOR IID INSTALLATION; PROVIDE PROOF OF ENROLLMENT (DL 107) OR A NOTICE OF COMPLETION CERTIFICATE (DL 101) FOR A DUI PROGRAM; FILE PROOF OF FINANCIAL RESPONSIBILITY (SR-22); PAY A $45 ADMINISTRATIVE SERVICE FEE, $15 OPTIONAL RESTRICTION FEE, AND ALL OTHER REQUIRED FEES.

FIRST-TIME DUI OFFENDERS WHO INSTALL AN IID AND MEET ALL REINSTATEMENT REQUIREMENTS MAY BE ENTITLED TO FULL DRIVING PRIVILEGES WITH IID INSTALLATION, INSTEAD OF RESTRICTIONS FOR DRIVING TO/FROM/DURING THE COURSE OF EMPLOYMENT AND TO/FROM DUI PROGRAM ACTIVITIES. REPEAT OFFENDERS WHO ARE ELIGIBLE TO REINSTATE EARLY WITH IID INSTALLATION MUST MEET ALL REQUIREMENTS SPECIFIED ABOVE AND SUBMIT A "VERIFICATION OF INSTALLATION" FORM (DL 920).

YOU WILL BE LIMITED TO DRIVING ONLY VEHICLES EQUIPPED WITH A CERTIFIED IID UNTIL YOUR IID RESTRICTION ENDS. THE INSTALLATION OF AN IID ON A VEHICLE DOES NOT ALLOW A PERSON TO DRIVE WITHOUT A VALID DRIVER LICENSE.

ALL REQUIRED FORMS AND FEES MUST BE MAILED TO THE DEPARTMENT OF MOTOR VEHICLES (DMV), PO BOX 942890, SACRAMENTO, CA, 94290-0001, OR SUBMITTED IN PERSON AT A DMV FIELD OFFICE.

ADDITIONAL INFORMATION REGARDING THE IID PILOT PROGRAM IS AVAILABLE ON OUR WEBSITE AT HTTP://DMV.CA.GOV/DL/IID_PILOT_PROGRAM.HTM. TO ASK ABOUT ELIGIBILITY FOR REINSTATEMENT OR IID RESTRICTION, CALL THE MANDATORY ACTIONS UNIT AT (916) 657-6525. TO CONTACT AN IID INSTALLER CALL THE TOLL-FREE NUMBER OF ONE OF THE FOLLOWING COMPANIES:

GLOBAL INTERLOCK SERVICE	1-877-794-3984
DRAEGER SAFETY DIAGNOSTICS, INC.	1-800-332-6858
BEST LABS, INC.	1-877-715-2253
SMART START, INC.	1-800-880-3394
INTOXALOCK	1-877-777-5020
LOW COST INTERLOCK	1-800-352-4872
INSTANT INTERLOCK	1-800-957-0036
GUARDIAN INTERLOCK SYSTEMS	1-800-499-0994
ALCOLOCK	1-877-258-5696
ALCO ALERT INTERLOCK, INC.	1-888-663-9847
ALCOHOL DETECTION SYSTEMS, INC.	1-888-786-7384
LIFESAFER INTERLOCK, INC.	1-800-210-8087
AUTOSENSE INTERNATIONAL	1-800-498-9071

OFFENDERS WITH LIMITED INCOMES MAY BE ELIGIBLE FOR REDUCE-FEE IIDS; TO QUALIFY, YOU WILL NEED TO PROVIDE VERIFICATION OF YOUR INCOME TO THE INSTALLER.

THIS ACTION IS INDEPENDENT OF ANY OTHER ACTION TAKEN BY THE COURT OR THIS DEPARTMENT.

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APPENDIX C

Table C

Post Propensity Score Matching Descriptive Statistics for Selected Variables by AB 91 Evaluation and DUI Offender Group

Study group	Sample size	Mean age	% Male	Prior 3-year total crashes/ 100 drivers	Prior 3-year total convictions/ 100 drivers
AB 91 intent-to-treat evaluation					
First DUI offender					
Treatment	60,091	33.98	71.17	40.99	214.51
Comparison	60,091	33.97	71.38	40.45	213.58
Second DUI offender					
Treatment	18,142	36.15	79.13	40.67	250.58
Comparison	18,142	36.19	78.91	39.66	248.28
Third & subsequent DUI offender					
Treatment	5,357	37.86	85.36	38.75	268.77
Comparison	5,357	38.02	84.26	37.93	261.81
AB 91 IID/restricted license evaluation					
First DUI offender					
Treatment	27,295	35.43	68.10	39.73	197.15
Comparison	27,295	35.46	68.17	37.79	197.52
Second DUI offender					
Treatment	7,315	35.88	77.21	40.08	231.47
Comparison	7,315	35.48	80.41	35.04	221.09
Third & subsequent DUI offender					
Treatment	1,100	36.87	83.91	33.91	243.45
Comparison	1,100	36.52	85.73	31.55	239.91

APPENDIX D

Variables Assessed for Propensity Score Matching Equations

1) Age
2) Gender
3) License class
4) Prior 3-year had-been-drinking crashes
5) Prior 3-year nighttime crashes
6) Prior 3-year fatal/injury crashes
7) Prior 3-year weekend crashes
8) Prior 3-year total crashes
9) Prior 3-year total convictions
10) Prior 3-year minor convictions
11) Prior 3-year major convictions
12) Prior 3-year zip code total crashes
13) Prior 3-year zip code injury crashes
14) Prior 3-year zip code total convictions
15) Prior 3-year zip code moving violations
16) Prior 3-year zip code major convictions
17) License class
18) Prior 3-year first APS suspension
19) Prior 3-year repeat APS suspension
20) BAC level of qualifying DUI violation
21) Days in study

APPENDIX E

Senate Bill No. 598

CHAPTER 193

An act to amend Sections 13352, 13352.5, 23109, 23550, 23550.5, 23552, 23566, and 23568 of the Vehicle Code, relating to vehicles.

[Approved by Governor October 11, 2009. Filed with Secretary of State October 11, 2009.]

LEGISLATIVE COUNSEL'S DIGEST

SB 598, Huff. Vehicles: driving under the influence (DUI).

(1) Existing law requires a person's privilege to operate a motor vehicle to be suspended or revoked for a specified period of time if the person has been convicted of violating specified provisions prohibiting driving a motor vehicle while under the influence of an alcoholic beverage or drug, or the combined influence of an alcoholic beverage and drug, or with 0.08% or more, by weight, of alcohol in his or her blood, or who is addicted to the use of any drug. Existing law authorizes a person whose privilege is suspended or revoked in that manner to receive a restricted driver's license if specified requirements are met, including, in some instances, the installation of a certified ignition interlock device on the person's vehicle.

Existing law requires that a person, convicted of driving under the influence, without bodily injury to another, within 10 years of being convicted of a separate violation of one of specified driving-under-the-influence offenses, be punished by his or her driving privilege being suspended for 2 years. The Department of Motor Vehicles is required to advise the person that he or she may apply for a restricted driver's license after completion of 12 months of the suspension period, which may include credit for a specified concurrent suspension, subject to certain conditions, including, among other things, submitting proof of installation of a certified ignition interlock device, agreeing to maintain the ignition interlock device, and paying certain fees, including, but not limited to, all administrative fees or reissue fees.

This bill would instead require the department to advise a person, who was only under the influence of an alcoholic beverage at the time of the violation, that he or she may apply for a restricted driver's license after completion of 90 days of the suspension period, under certain circumstances.

(2) Existing law requires that a person convicted of driving under the influence, without bodily injury to another, within 10 years of being convicted of 2 separate violations of specified driving-under-the-influence offenses, be punished by his or her driving privilege being revoked for 3 years. The department is required to advise the person that he or she may apply for a restricted driver's license after completion of 12 months of the

revocation period, which may include credit for a specified concurrent suspension, subject to certain conditions, including, among other things, satisfactory completion of 12 months of an 18-month or 30-month driving-under-the-influence program, submitting proof of installation of a certified ignition interlock device, agreeing to maintain the ignition interlock device, and paying certain fees.

This bill would instead require the department to advise a person, who was found to be only under the influence of an alcoholic beverage at the time of the violation, of his or her ability to apply for a restricted driver's license after completion of 6 months of the revocation period, subject to certain conditions, including that if the person is convicted of a specified offense that person subsequently satisfactorily provides proof of enrollment in an 18-month or 30-month driving-under-the-influence program, as prescribed. The bill would require the person to pay a fee sufficient to cover the costs of administration, as determined by the department.

(3) This bill would require that a person convicted of driving under the influence of any drug or the combined influence of any drug and an alcoholic beverage, without bodily injury to another, within 10 years of being convicted of a separate violation of one of the specified driving-under-the-influence offenses, be punished by his or her driving privilege being revoked for 2 years. This bill would authorize the department to reinstate the privilege provided certain conditions are met. This bill would require the department to advise the person that he or she may apply for a restricted driver's license after completion of 12 months of the suspended period, subject to certain conditions including, among other things, that the person provides proof of enrollment in an 18-month or 30-month driving-under-the-influence program, as prescribed.

(4) This bill would also require a person convicted of driving under the influence of any drug or the combined influence of any drug and an alcoholic beverage, without bodily injury to another, within 10 years of being convicted of 2 separate violations of specified driving-under-the-influence offenses, be punished by his or her driving privilege being revoked for 3 years. This bill would authorize the department to reinstate the privilege provided certain conditions are met. This bill would require the department to advise the person that he or she may apply for a restricted driver's license after completion of 12 months of the suspended period, subject to certain conditions, including, among other things, that the person has satisfactorily completed the initial 12 months of an 18-month or 30-month driving-under-the-influence program as prescribed.

(5) This bill would make other conforming changes.

(6) This bill would become operative on July 1, 2010.

The people of the State of California do enact as follows:

SECTION 1. Section 13352 of the Vehicle Code is amended to read:

13352. (a) The department shall immediately suspend or revoke the privilege of a person to operate a motor vehicle upon the receipt of an abstract of the record of a court showing that the person has been convicted of a violation of Section 23152 or 23153, subdivision (a) of Section 23109, or Section 23109.1, or upon the receipt of a report of a judge of the juvenile court, a juvenile traffic hearing officer, or a referee of a juvenile court showing that the person has been found to have committed

a violation of Section 23152 or 23153 or subdivision (a) of Section 23109 or Section 23109.1. If an offense specified in this section occurs in a vehicle defined in Section 15210, the suspension or revocation specified below shall apply to the noncommercial driving privilege. The commercial driving privilege shall be disqualified as specified in Sections 15300 to 15302, inclusive. For the purposes of this section, suspension or revocation shall be as follows:

(1) Except as required under Section 13352.1 or 13352.4, upon a conviction or finding of a violation of Section 23152 punishable under Section 23536, the privilege shall be suspended for a period of six months.

The privilege may not be reinstated until the person gives proof of financial responsibility and gives proof satisfactory to the department of successful completion of a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code described in subdivision (b) of Section 23538. If the court, as authorized under paragraph (3) of subdivision (b) of Section 23646, elects to order a person to enroll in, participate in, and complete either program described in subdivision (b) of Section 23542, the department shall require that program in lieu of the program described in subdivision (b) of Section 23538. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit may not be given to any program activities completed prior to the date of the current violation.

(2) Upon a conviction or finding of a violation of Section 23153 punishable under Section 23554, the privilege shall be suspended for a period of one year. The privilege may not be reinstated until the person gives proof of financial responsibility and gives proof satisfactory to the department of successful completion of a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code as described in subdivision (b) of Section 23556. If the court, as authorized under paragraph (3) of subdivision (b) of Section 23646, elects to order a person to enroll in, participate in, and complete either program described in subdivision (b) of Section 23542, the department shall require that program in lieu of the program described in Section 23556. For the purposes of this paragraph, enrollment, participation, and completion of an approved program shall be subsequent to the date of the current violation. Credit may not be given to any program activities completed prior to the date of the current violation.

(3) Except as provided in Section 13352.5, upon a conviction or finding of a violation of Section 23152 punishable under Section 23540, and if the person was found to be only under the influence of an alcoholic beverage at the time of the violation of Section 23152, the privilege shall be suspended for two years. The privilege may not be reinstated until the person gives proof of financial responsibility and gives proof satisfactory to the department of successful completion of a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code as described in subdivision (b) of Section 23542. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise a person convicted or found to be in violation of subdivision (a) or (b) of Section 23152 that after completion of 90 days of the suspension period,

which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license. Eligibility for the restricted driver's license is subject to the following conditions:

(A) The person has satisfactorily provided, subsequent to the violation date of the current underlying conviction, either of the following:

(i) Proof of enrollment in an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code.

(ii) Proof of enrollment in a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment.

(B) The person agrees, as a condition of the restriction, to continue satisfactory participation in the program described in subparagraph (A).

(C) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(D) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(E) The person provides proof of financial responsibility, as defined in Section 16430.

(F) The person pays all reissue fees and any restriction fee required by the department.

(G) The person pays to the department a fee sufficient to cover the costs of administration of this paragraph, as determined by the department.

(H) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(4) Except as provided in this paragraph, upon a conviction or finding of a violation of Section 23153 punishable under Section 23560, the privilege shall be revoked for a period of three years. The privilege may not be reinstated until the person gives proof of financial responsibility, and the person gives proof satisfactory to the department of successful completion of a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as described in paragraph (4) of subdivision (b) of Section 23562. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise the person that after the completion of 12 months of the revocation period, which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license, subject to the following conditions:

(A) The person has satisfactorily completed, subsequent to the violation date of the current underlying conviction, either of the following:

(i) The initial 12 months of an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code.

(ii) The initial 12 months of a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment, and the person agrees, as a condition of the restriction, to continue satisfactory participation in that 30-month program.

(B) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(C) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(D) The person provides proof of financial responsibility, as defined in Section 16430.

(E) The person pays all applicable reinstatement or reissue fees and any restriction fee required by the department.

(F) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(5) Except as provided in this paragraph, upon a conviction or finding of a violation of Section 23152 punishable under Section 23546, and if the person was found to be only under the influence of an alcoholic beverage at the time of the violation of Section 23152, the privilege shall be revoked for a period of three years. The privilege may not be reinstated until the person files proof of financial responsibility and gives proof satisfactory to the department of successful completion of one of the following programs: an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as described in subdivision (b) or (c) of Section 23548, or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, or a program specified in Section 8001 of the Penal Code. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise a person convicted or found to be in violation of subdivision (a) or (b) of Section 23152 that after completion of six months of the revocation period, which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license. Eligibility for the restricted driver's license is subject to the following conditions:

(A) The person has satisfactorily provided, subsequent to the violation date of the current underlying conviction, one of the following:

(i) With regard to a conviction under subdivision (a) or (b) of Section 23152, proof of enrollment in an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code.

(ii) With regard to a conviction under subdivision (a) or (b) of Section 23152, proof of enrollment in a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment, and the person agrees, as a condition of the restriction, to continue satisfactory participation in the 30-month driving-under-the-influence program.

(B) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(C) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(D) The person provides proof of financial responsibility, as defined in Section 16430.

(E) An individual convicted of a violation of Section 23152 punishable under Section 23546 may also, at any time after sentencing, petition the court for referral to an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code. Unless good cause is shown, the court shall order the referral.

(F) The person pays all applicable reinstatement or reissue fees and any restriction fee required by the department.

(G) The person pays to the department a fee sufficient to cover the costs of administration of this paragraph, as determined by the department.

(H) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(6) Except as provided in this paragraph, upon a conviction or finding of a violation of Section 23152 punishable under Section 23540, and if the person was found to be under the influence of any drug or the combined influence of any drug and an alcoholic beverage, the privilege shall be suspended for two years. The privilege may not be reinstated until the person gives proof of financial responsibility and gives proof satisfactory to the department of successful completion of a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code as described in subdivision (b) of Section 23542. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise the person that after completion of 12 months of the suspension period, which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license, subject to the following conditions:

(A) The person has satisfactorily provided, subsequent to the violation date of the current underlying conviction, either of the following:

(i) Proof of enrollment in an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code.

(ii) Proof of enrollment in a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment.

(B) The person agrees, as a condition of the restriction, to continue satisfactory participation in the program described in subparagraph (A).

(C) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(D) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(E) The person provides proof of financial responsibility, as defined in Section 16430.

(F) The person pays all administrative fees or reissue fees and any restriction fee required by the department.

(G) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(7) Except as provided in this paragraph, upon a conviction or finding of a violation of Section 23152 punishable under Section 23546, and if the

person was found to be under the influence of any drug or the combined influence of any drug and an alcoholic beverage, the privilege shall be revoked for a period of three years. The privilege may not be reinstated until the person files proof of financial responsibility and gives proof satisfactory to the department of successful completion of an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as described in subdivision (b) or (c) of Section 23548, or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, or a program specified in Section 8001 of the Penal Code. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise the person that after completion of 12 months of the revocation period, which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license, subject to the following conditions:

(A) The person has satisfactorily completed, subsequent to the violation date of the current underlying conviction, either of the following:

(i) The initial 12 months of an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code.

(ii) The initial 12 months of a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment, and the person agrees, as a condition of the restriction, to continue satisfactory participation in the 30-month driving-under-the-influence program.

(B) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(C) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(D) The person provides proof of financial responsibility, as defined in Section 16430.

(E) An individual convicted of a violation of Section 23152 punishable under Section 23546 may also, at any time after sentencing, petition the court for referral to an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code. Unless good cause is shown, the court shall order the referral.

(F) The person pays all applicable reinstatement or reissue fees and any restriction fee required by the department.

(G) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(8) Except as provided in this paragraph, upon a conviction or finding of a violation of Section 23153 punishable under Section 23550.5 or 23566, the privilege shall be revoked for a period of five years. The privilege may not be reinstated until the person gives proof of financial responsibility and proof satisfactory to the department of successful completion of one of the

following programs: an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as described in subdivision (b) of Section 23568 or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, or a program specified in Section 8001 of the Penal Code. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise the person that after the completion of 12 months of the revocation period, which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license, subject to the following conditions:

(A) The person has satisfactorily completed, subsequent to the violation date of the current underlying conviction, either of the following:

(i) The initial 12 months of a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment, and the person agrees, as a condition of the restriction, to continue satisfactory participation in the 30-month driving-under-the-influence program.

(ii) The initial 12 months of an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if a 30-month program is unavailable in the person's county of residence or employment.

(B) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(C) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(D) The person provides proof of financial responsibility, as defined in Section 16430.

(E) An individual convicted of a violation of Section 23153 punishable under Section 23566 may also, at any time after sentencing, petition the court for referral to an 18-month driving-under-the-influence program or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code. Unless good cause is shown, the court shall order the referral.

(F) The person pays all applicable reinstatement or reissue fees and any restriction fee required by the department.

(G) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(9) Except as provided in this paragraph, upon a conviction or finding of a violation of Section 23152 punishable under Section 23550 or 23550.5, or Section 23153 punishable under Section 23550.5 the privilege shall be revoked for a period of four years. The privilege may not be reinstated until the person gives proof of financial responsibility and proof satisfactory to the department of successful completion of one of the following programs: an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section

11836 of the Health and Safety Code, or a program specified in Section 8001 of the Penal Code. For the purposes of this paragraph, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation. The department shall advise the person that after the completion of 12 months of the revocation period, which may include credit for a suspension period served under subdivision (c) of Section 13353.3, the person may apply to the department for a restricted driver's license, subject to the following conditions:

(A) The person has satisfactorily completed, subsequent to the violation date of the current underlying conviction, either of the following:

(i) The initial 12 months of an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code.

(ii) The initial 12 months of a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, if available in the county of the person's residence or employment, and the person agrees, as a condition of the restriction, to continue satisfactory participation in the 30-month driving-under-the-influence program.

(B) The person submits the "Verification of Installation" form described in paragraph (2) of subdivision (g) of Section 13386.

(C) The person agrees to maintain the ignition interlock device as required under subdivision (g) of Section 23575.

(D) The person provides proof of financial responsibility, as defined in Section 16430.

(E) An individual convicted of a violation of Section 23152 punishable under Section 23550 may also, at any time after sentencing, petition the court for referral to an 18-month driving-under-the-influence program or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code. Unless good cause is shown, the court shall order the referral.

(F) The person pays all applicable reinstatement or reissue fees and any restriction fee required by the department.

(G) The restriction shall remain in effect for the period required in subdivision (f) of Section 23575.

(10) Upon a conviction or finding of a violation of subdivision (a) of Section 23109 that is punishable under subdivision (e) of that section or Section 23109.1, the privilege shall be suspended for a period of 90 days to six months, if ordered by the court. The privilege may not be reinstated until the person gives proof of financial responsibility, as defined in Section 16430.

(11) Upon a conviction or finding of a violation of subdivision (a) of Section 23109 that is punishable under subdivision (f) of that section, the privilege shall be suspended for a period of six months, if ordered by the court. The privilege may not be reinstated until the person gives proof of financial responsibility, as defined in Section 16430.

(b) For the purpose of paragraphs (2) to (11), inclusive, of subdivision (a), the finding of the juvenile court judge, the juvenile hearing officer, or the referee of a juvenile court of a commission of a violation of Section

23152 or 23153 or subdivision (a) of Section 23109 or Section 23109.1, as specified in subdivision (a) of this section, is a conviction.

(c) A judge of a juvenile court, juvenile hearing officer, or referee of a juvenile court shall immediately report the findings specified in subdivision (a) to the department.

(d) A conviction of an offense in a state, territory, or possession of the United States, the District of Columbia, the Commonwealth of Puerto Rico, or Canada that, if committed in this state, would be a violation of Section 23152, is a conviction of Section 23152 for the purposes of this section, and a conviction of an offense that, if committed in this state, would be a violation of Section 23153, is a conviction of Section 23153 for the purposes of this section. The department shall suspend or revoke the privilege to operate a motor vehicle pursuant to this section upon receiving notice of that conviction.

(e) For the purposes of the restriction conditions specified in paragraphs (3) to (9), inclusive, of subdivision (a), the department shall terminate the restriction imposed pursuant to this section and shall suspend or revoke the person's driving privilege upon receipt of notification from the driving-under-the-influence program that the person has failed to comply with the program requirements. The person's driving privilege shall remain suspended or revoked for the remaining period of the original suspension or revocation imposed under this section and until all reinstatement requirements described in this section are met.

(f) For the purposes of this section, completion of a program is the following:

(1) Satisfactory completion of all program requirements approved pursuant to program licensure, as evidenced by a certificate of completion issued, under penalty of perjury, by the licensed program.

(2) Certification, under penalty of perjury, by the director of a program specified in Section 8001 of the Penal Code, that the person has completed a program specified in Section 8001 of the Penal Code.

(g) The holder of a commercial driver's license who was operating a commercial motor vehicle, as defined in Section 15210, at the time of a violation that resulted in a suspension or revocation of the person's noncommercial driving privilege under this section is not eligible for the restricted driver's license authorized under paragraphs (3) to (9), inclusive, of subdivision (a).

SEC. 2. Section 13352.5 of the Vehicle Code is amended to read:

13352.5. (a) The department shall issue a restricted driver's license to a person whose driver's license was suspended under paragraph (3) of subdivision (a) of Section 13352, if all of the following requirements have been met:

(1) Proof satisfactory to the department of enrollment in, or completion of, a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as described in subdivision (b) of Section 23542 has been received in the department's headquarters.

(2) The person submits proof of financial responsibility, as described in Section 16430.

(3) The person completes not less than 90 days of the suspension period imposed under paragraph (3) of subdivision (a) of Section 13352. The 90 days may include credit for any suspension period served under subdivision (c) of Section 13353.3.

(4) The person pays all applicable reinstatement or reissue fees and any restriction fee required by the department.

(b) The restriction of the driving privilege shall become effective when the department receives all of the documents and fees required under subdivision (a) and shall remain in effect until the final day of the original suspension imposed under paragraph (3) of subdivision (a) of Section 13352, or until the date all reinstatement requirements described in Section 13352 have been met, whichever date is later.

(c) The restriction of the driving privilege shall be limited to the hours necessary for driving to and from the person's place of employment, driving during the course of employment, and driving to and from activities required in the driving-under-the-influence program.

(d) Whenever the driving privilege is restricted under this section, proof of financial responsibility, as defined in Section 16430, shall be maintained for three years. If the person does not maintain that proof of financial responsibility at any time during the restriction, the driving privilege shall be suspended until the proof required under Section 16484 is received by the department.

(e) For the purposes of this section, enrollment in, participation in, and completion of an approved program shall be subsequent to the date of the current violation. Credit shall not be given to any program activities completed prior to the date of the current violation.

(f) The department shall terminate the restriction imposed pursuant to this section and shall suspend the privilege to drive under paragraph (3) of subdivision (a) of Section 13352 upon receipt of notification from the driving-under-the-influence program that the person has failed to comply with the program requirements.

(g) If, upon conviction, the court has made the determination, as authorized under subdivision (b) of Section 23540 or subdivision (d) of Section 23542, to disallow the issuance of a restricted driver's license, the department shall not issue a restricted driver's license under this section.

(h) A person restricted pursuant to this section may apply to the department for a restricted driver's license, subject to the conditions specified in paragraph (3) of subdivision (a) of Section 13352. Whenever proof of financial responsibility has already been provided and a restriction fee has been paid in compliance with restrictions described in this section, and the offender subsequently receives an ignition interlock device restriction described in paragraph (3) of subdivision (a) of Section 13352, the proof of financial responsibility period shall not be extended beyond the previously established term and no additional restriction fee shall be required.

(i) This section applies to a person who meets all of the following conditions:

(1) Has been convicted of a violation of Section 23152 that occurred on or before July 1, 1999, and is punishable under Section 23540, or former Section 23165.

(2) Was granted probation for the conviction subject to conditions imposed under subdivision (b) of Section 23542, or under subdivision (b) of former Section 23166.

(3) Is no longer subject to the probation described in paragraph (2).

(4) Has not completed the licensed driving-under-the-influence program under paragraph (3) of subdivision (a) of Section 13352 for reinstatement of the driving privilege.

(5) Has no violations in his or her driving record that would preclude issuance of a restricted driver's license.

SEC. 3. Section 23109 of the Vehicle Code is amended to read:

23109. (a) A person shall not engage in a motor vehicle speed contest on a highway. As used in this section, a motor vehicle speed contest includes a motor vehicle race against another vehicle, a clock, or other timing device. For purposes of this section, an event in which the time to cover a prescribed route of more than 20 miles is measured, but where the vehicle does not exceed the speed limits, is not a speed contest.

(b) A person shall not aid or abet in any motor vehicle speed contest on any highway.

(c) A person shall not engage in a motor vehicle exhibition of speed on a highway, and a person shall not aid or abet in a motor vehicle exhibition of speed on any highway.

(d) A person shall not, for the purpose of facilitating or aiding or as an incident to any motor vehicle speed contest or exhibition upon a highway, in any manner obstruct or place a barricade or obstruction or assist or participate in placing a barricade or obstruction upon any highway.

(e) (1) A person convicted of a violation of subdivision (a) shall be punished by imprisonment in a county jail for not less than 24 hours nor more than 90 days or by a fine of not less than three hundred fifty-five dollars ($355) nor more than one thousand dollars ($1,000), or by both that fine and imprisonment. That person shall also be required to perform 40 hours of community service. The court may order the privilege to operate a motor vehicle suspended for 90 days to six months, as provided in paragraph (10) of subdivision (a) of Section 13352. The person's privilege to operate a motor vehicle may be restricted for 90 days to six months to necessary travel to and from that person's place of employment and, if driving a motor vehicle is necessary to perform the duties of the person's employment, restricted to driving in that person's scope of employment. This subdivision does not interfere with the court's power to grant probation in a suitable case.

(2) If a person is convicted of a violation of subdivision (a) and that violation proximately causes bodily injury to a person other than the driver, the person convicted shall be punished by imprisonment in a county jail for not less than 30 days nor more than six months or by a fine of not less than five hundred dollars ($500) nor more than one thousand dollars ($1,000), or by both that fine and imprisonment.

(f) (1) If a person is convicted of a violation of subdivision (a) for an offense that occurred within five years of the date of a prior offense that resulted in a conviction of a violation of subdivision (a), that person shall be punished by imprisonment in a county jail for not less than four days nor more than six months, and by a fine of not less than five hundred dollars ($500) nor more than one thousand dollars ($1,000).

(2) If the perpetration of the most recent offense within the five-year period described in paragraph (1) proximately causes bodily injury to a person other than the driver, a person convicted of that second violation shall be imprisoned in a county jail for not less than 30 days nor more than six months and by a fine of not less than five hundred dollars ($500) nor more than one thousand dollars ($1,000).

(3) If the perpetration of the most recent offense within the five-year period described in paragraph (1) proximately causes serious bodily injury, as defined in paragraph (4) of subdivision (f) of Section 243 of the Penal

Code, to a person other than the driver, a person convicted of that second violation shall be imprisoned in the state prison, or in a county jail for not less than 30 days nor more than one year, and by a fine of not less than five hundred dollars ($500) nor more than one thousand dollars ($1,000).

(4) The court shall order the privilege to operate a motor vehicle of a person convicted under paragraph (1), (2), or (3) suspended for a period of six months, as provided in paragraph (11) of subdivision (a) of Section 13352. In lieu of the suspension, the person's privilege to operate a motor vehicle may be restricted for six months to necessary travel to and from that person's place of employment and, if driving a motor vehicle is necessary to perform the duties of the person's employment, restricted to driving in that person's scope of employment.

(5) This subdivision does not interfere with the court's power to grant probation in a suitable case.

(g) If the court grants probation to a person subject to punishment under subdivision (f), in addition to subdivision (f) and any other terms and conditions imposed by the court, which may include a fine, the court shall impose as a condition of probation that the person be confined in a county jail for not less than 48 hours nor more than six months. The court shall order the person's privilege to operate a motor vehicle to be suspended for a period of six months, as provided in paragraph (11) of subdivision (a) of Section 13352 or restricted pursuant to subdivision (f).

(h) If a person is convicted of a violation of subdivision (a) and the vehicle used in the violation is registered to that person, the vehicle may be impounded at the registered owner's expense for not less than one day nor more than 30 days.

(i) A person who violates subdivision (b), (c), or (d) shall upon conviction of that violation be punished by imprisonment in a county jail for not more than 90 days, by a fine of not more than five hundred dollars ($500), or by both that fine and imprisonment.

(j) If a person's privilege to operate a motor vehicle is restricted by a court pursuant to this section, the court shall clearly mark the restriction and the dates of the restriction on that person's driver's license and promptly notify the Department of Motor Vehicles of the terms of the restriction in a manner prescribed by the department. The Department of Motor Vehicles shall place that restriction in the person's records in the Department of Motor Vehicles and enter the restriction on a license subsequently issued by the Department of Motor Vehicles to that person during the period of the restriction.

(k) The court may order that a person convicted under this section, who is to be punished by imprisonment in a county jail, be imprisoned on days other than days of regular employment of the person, as determined by the court.

(l) This section shall be known and may be cited as the Louis Friend Memorial Act. SEC. 4. Section 23550 of the Vehicle Code is amended to read: 23550. (a) If a person is convicted of a violation of Section 23152 and the offense occurred within 10 years of three or more separate violations of Section 23103, as specified in Section 23103.5, or Section 23152 or 23153, or any combination thereof, that resulted in convictions, that person shall be punished by imprisonment in the state prison, or in a county jail for not less than 180 days nor more than one year, and by a fine of not less than three hundred ninety dollars ($390) nor more than one thousand dollars ($1,000). The person's privilege to operate a motor

vehicle shall be revoked by the Department of Motor Vehicles pursuant to paragraph (9) of subdivision (a) of Section 13352. The court shall require the person to surrender the driver's license to the court in accordance with Section 13550.

(b) A person convicted of a violation of Section 23152 punishable under this section shall be designated as a habitual traffic offender for a period of three years, subsequent to the conviction. The person shall be advised of this designation pursuant to subdivision (b) of Section 13350.

SEC. 5. Section 23550.5 of the Vehicle Code is amended to read:

23550.5. (a) A person is guilty of a public offense, punishable by imprisonment in the state prison or confinement in a county jail for not more than one year and by a fine of not less than three hundred ninety dollars ($390) nor more than one thousand dollars ($1,000) if that person is convicted of a violation of Section 23152 or 23153, and the offense occurred within 10 years of any of the following:

(1) A prior violation of Section 23152 that was punished as a felony under Section 23550 or this section, or both, or under former Section 23175 or former Section 23175.5, or both.

(2) A prior violation of Section 23153 that was punished as a felony.

(3) A prior violation of paragraph (1) of subdivision (c) of Section 192 of the Penal Code that was punished as a felony.

(b) Each person who, having previously been convicted of a violation of subdivision (a) of Section 191.5 of the Penal Code, a felony violation of subdivision (b) of Section 191.5, or a violation of subdivision (a) of Section 192.5 of the Penal Code, is subsequently convicted of a violation of Section 23152 or 23153 is guilty of a public offense punishable by imprisonment in the state prison or confinement in a county jail for not more than one year and by a fine of not less than three hundred ninety dollars ($390) nor more than one thousand dollars ($1,000).

(c) The privilege to operate a motor vehicle of a person convicted of a violation that is punishable under subdivision (a) or (b) shall be revoked by the department under paragraph (9) of subdivision (a) of Section 13352, unless paragraph (8) of subdivision (a) of Section 13352 is also applicable, in which case the privilege shall be revoked under that provision. The court shall require the person to surrender the driver's license to the court in accordance with Section 13550.

(d) A person convicted of a violation of Section 23152 or 23153 that is punishable under this section shall be designated as a habitual traffic offender for a period of three years, subsequent to the conviction. The person shall be advised of this designation under subdivision (b) of Section 13350.

SEC. 6. Section 23552 of the Vehicle Code is amended to read:

23552. (a) (1) If the court grants probation to a person punished under Section 23550, in addition to the provisions of Section 23600 and any other terms and conditions imposed by the court, the court shall impose as conditions of probation that the person be confined in a county jail for at least 180 days but not more than one year and pay a fine of at least three hundred ninety dollars ($390) but not more than one thousand dollars ($1,000).

(2) The person's privilege to operate a motor vehicle shall be revoked by the department under paragraph (9) of subdivision (a) of Section 13352. The court shall require the person to surrender the driver's license to the court in accordance with Section 13550.

(b) In addition to subdivision (a), if the court grants probation to any person punished under Section 23550, the court may order as a condition of probation that the person participate, for at least 30 months subsequent to the underlying conviction and in a manner satisfactory to the court, in a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code. In lieu of the minimum term of imprisonment in subdivision (a), the court shall impose as a condition of probation under this subdivision that the person be confined in the county jail for at least 30 days but not more than one year. The court shall not order the treatment prescribed by this subdivision unless the person makes a specific request and shows good cause for the order, whether or not the person has previously completed a treatment program pursuant to subdivision (b) of Section 23542 or paragraph (4) of subdivision (b) of Section 23562. In order to enable all required persons to participate, each person shall pay the program costs commensurate with the person's ability to pay as determined pursuant to Section 11837.4 of the Health and Safety Code. No condition of probation required pursuant to this subdivision is a basis for reducing any other probation requirement in this section or Section 23600 or for avoiding the mandatory license revocation provisions of paragraph (9) of subdivision (a) of Section 13352.

(c) In addition to Section 23600 and subdivision (a), if the court grants probation to any person punished under Section 23550 who has not previously completed a treatment program pursuant to subdivision (b) of Section 23542 or paragraph (4) of subdivision (b) of Section 23562, and unless the person is ordered to participate in, and complete, a program under subdivision (b), the court shall impose as a condition of probation that the person, subsequent to the date of the current violation, enroll in and participate, for at least 18 months and in a manner satisfactory to the court, in a driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as designated by the court. The person shall complete the entire program subsequent to, and shall not be given any credit for program activities completed prior to, the date of the current violation. A person who has previously completed a 12-month or 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code shall not be eligible for referral pursuant to this subdivision unless a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code is not available for referral in the county of the person's residence or employment. A condition of probation required pursuant to this subdivision is not a basis for reducing any other probation requirement in this section or Section 23600 or for avoiding the mandatory license revocation provisions of paragraph (9) of subdivision (a) of Section 13352.

(d) The court shall advise the person at the time of sentencing that the driving privilege may not be restored until the person provides proof satisfactory to the department of successful completion of a driving-under-the-influence program of the length required under this code that is licensed pursuant to Section 11836 of the Health and Safety Code.

SEC. 7. Section 23566 of the Vehicle Code is amended to read:

23566. (a) If a person is convicted of a violation of Section 23153 and the offense occurred within 10 years of two or more separate violations of Section 23103, as specified in Section 23103.5, or Section 23152 or 23153, or any combination of these violations, that resulted in convictions, that person shall be punished by imprisonment in the state prison for a term of

two, three, or four years and by a fine of not less than one thousand fifteen dollars ($1,015) nor more than five thousand dollars ($5,000). The person's privilege to operate a motor vehicle shall be revoked by the Department of Motor Vehicles pursuant to paragraph (8) of subdivision (a) of Section 13352. The court shall require the person to surrender the driver's license to the court in accordance with Section 13550.

(b) If a person is convicted of a violation of Section 23153, and the act or neglect proximately causes great bodily injury, as defined in Section 12022.7 of the Penal Code, to any person other than the driver, and the offense occurred within 10 years of two or more separate violations of Section 23103, as specified in Section 23103.5, or Section 23152 or 23153, or any combination of these violations, that resulted in convictions, that person shall be punished by imprisonment in the state prison for a term of two, three, or four years and by a fine of not less than one thousand fifteen dollars ($1,015) nor more than five thousand dollars ($5,000). The person's privilege to operate a motor vehicle shall be revoked by the Department of Motor Vehicles pursuant to paragraph (8) of subdivision (a) of Section 13352. The court shall require the person to surrender the driver's license to the court in accordance with Section 13550.

(c) If a person is convicted under subdivision (b), and the offense for which the person is convicted occurred within 10 years of four or more separate violations of Section 23103, as specified in Section 23103.5, or Section 23152 or 23153, or any combination of these violations, that resulted in convictions, that person shall, in addition and consecutive to the sentences imposed under subdivision (b), be punished by an additional term of imprisonment in the state prison for three years.

The enhancement allegation provided in this subdivision shall be pleaded and proved as provided by law.

(d) A person convicted of Section 23153 punishable under this section shall be designated as a habitual traffic offender for a period of three years, subsequent to the conviction. The person shall be advised of this designation pursuant to subdivision (b) of Section 13350.

(e) A person confined in state prison under this section shall be ordered by the court to participate in an alcohol or drug program, or both, that is available at the prison during the person's confinement. Completion of an alcohol or drug program under this section does not meet the program completion requirement of paragraph (8) of subdivision (a) of Section 13352, unless the drug or alcohol program is licensed under Section 11836 of the Health and Safety Code, or is a program specified in Section 8001 of the Penal Code.

SEC. 8. Section 23568 of the Vehicle Code is amended to read:

23568. (a) If the court grants probation to a person punished under Section 23566, in addition to the provisions of Section 23600 and any other terms and conditions imposed by the court, the court shall impose as conditions of probation that the person be confined in the county jail for at least one year, that the person pay a fine of at least three hundred ninety dollars ($390) but not more than five thousand dollars ($5,000), and that the person make restitution or reparation pursuant to Section 1203.1 of the Penal Code. The person's privilege to operate a motor vehicle shall be revoked by the department under paragraph (8) of subdivision (a) of Section 13352. The court shall require the person to surrender the driver's license to the court in accordance with Section 13550.

(b) In addition to Section 23600 and subdivision (a), if the court grants probation to a person punished under Section 23566, the court shall impose as a condition of probation that the person enroll in and complete, subsequent to the date of the underlying violation and in a manner satisfactory to the court, an 18-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code or, if available in the county of the person's residence or employment, a 30-month driving-under-the-influence program licensed pursuant to Section 11836 of the Health and Safety Code, as designated by the court. The person shall complete the entire program subsequent to, and shall not be given any credit for program activities completed prior to, the date of the current violation. In lieu of the minimum term of imprisonment in subdivision (a), the court shall impose as a minimum condition of probation under this subdivision that the person be confined in the county jail for at least 30 days but not more than one year. Except as provided in this subdivision, if the court grants probation under this section, the court shall order the treatment prescribed by this subdivision, whether or not the person has previously completed a treatment program pursuant to subdivision (b) of Section 23542 or paragraph (4) of subdivision (b) of Section 23562. In order to enable all required persons to participate, each person shall pay the program costs commensurate with the person's ability to pay as determined pursuant to Section 11837.4 of the Health and Safety Code. No condition of probation required pursuant to this subdivision is a basis for reducing any other probation requirement in this section or Section 23600 or for avoiding the mandatory license revocation provisions of paragraph (8) of subdivision (a) of Section 13352.

(c) The court shall advise the person at the time of sentencing that the driving privilege may not be restored until the person provides proof satisfactory to the department of successful completion of a driving-under-the-influence program of the length required under this code that is licensed pursuant to Section 11836 of the Health and Safety Code.

SEC. 9. This act shall become operative on July 1, 2010.

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