



General Deterrent Evaluation of the Ignition Interlock Pilot Program in California

**A Report to the Legislature
of the State of California**

**In Accordance with Assembly Bill 91
Chapter 217, 2009 Legislative Session**

January 2015

EDMUND G. BROWN JR.
Governor

BRIAN P. KELLY, Secretary
California State Transportation Agency

JEAN SHIOMOTO
Director

© California Department of Motor Vehicles, 2014

REPORT DOCUMENTATION PAGE*Form Approved*
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.

1. REPORT DATE (DD-MM-YYYY) January 2015		2. REPORT TYPE Final Report		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE General Deterrent Evaluation of the Ignition Interlock Pilot Program in California				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Eric A. Chapman, Sladjana Oulad Daoud, and Scott V. Masten				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) California Department of Motor Vehicles Research and Development Branch P.O. Box 932382 Sacramento, CA 94232-3820				8. PERFORMING ORGANIZATION REPORT NUMBER CAL-DMV-RSS-14-247	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSORING/MONITORING AGENCY REPORT NUMBER	
12. DISTRIBUTION AVAILABILITY STATEMENT					
13. SUPPLEMENTARY NOTES - email: research@dmv.ca.gov					
14. ABSTRACT					
<p>This study presents a general deterrence evaluation of the ignition interlock pilot program mandated by Assembly Bill 91 for the counties of Alameda, Los Angeles, Sacramento, and Tulare during the period of July 1, 2010 through January 1, 2016. This pilot program requires convicted first and repeat DUI offenders to install an IID on all vehicles they own or operate for a pre-specified time period in order to obtain a restricted, reissued, or reinstated driver's license. The present study analyzes DUI conviction data from July 2007 through June 2013. The results indicate that IID installation rates among all DUI offenders increased dramatically in the pilot counties from 2.1% during the pre-pilot period to 42.4% during the pilot period. The results of the Auto-Regressive Integrated Moving Average (ARIMA) analyses show that the IID pilot program was not associated with a reduction in the number of first-time and repeat DUI convictions in the pilot counties. In other words, no evidence was found that the pilot program has a general deterrence effect.</p> <p>A follow-up study is being conducted to determine if the pilot program has any specific deterrence effects. It is recommended that any subsequent legislative action on this subject take into consideration the findings of this specific deterrence evaluation. This evaluation is anticipated to be completed in the fall of 2015.</p>					
15. SUBJECT TERMS ignition interlock, driving under the influence of alcohol, general deterrence evaluation, pilot program, specific deterrence evaluation					
16. SECURITY CLASSIFICATION OF: Unclassified			17. LIMITATION OF ABSTRACT None	18. NUMBER OF PAGES 60	19a. NAME OF RESPONSIBLE PERSON Douglas P. Rickard
A. REPORT Unclassified	B. ABSTRACT Unclassified	C. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (Include area code) 916-657-5768

PREFACE

This report presents the results of an evaluation of the ignition interlock device pilot program in California, which was mandated by the California Legislature (AB 91 – Feuer). The report was prepared by the Research and Development Branch of the California Department of Motor Vehicles. The findings, opinions, and conclusions presented in this report are those of the authors and not necessarily those of the State of California.

ACKNOWLEDGMENTS

The authors would like to acknowledge with appreciation the many individuals who contributed to this study. Dave DeYoung, Chief of the Research and Development Branch (retired), provided general direction and guidance at the beginning of the study. Michael Gebers and Bayliss Camp, Acting Chiefs of the Research and Development Branch, assisted with the interpretation of the study results and reviewed the final version of the report. Douglas Rickard, Associate Governmental Program Analyst, helped preparing final tables and figures for the report and provided general assistance in the report production. The authors also wish to acknowledge the contributions of Helen Tashima, Research Program Specialist II (retired), Patrice Rogers, Research Program Specialist II, and Ann Lambert, Research Program Specialist I, of the Research and Development Branch.

In addition, we wish to acknowledge the support of the management and staff of the Mandatory Actions Unit within the Driver Licensing Branch, and, in particular, the assistance provided by David Adams, Manager I, and Aaron Meaux, Manager III.

EXECUTIVE SUMMARY

Introduction

Driving under the influence (DUI) of alcohol continues to be a major threat to traffic safety, although considerably less people are dying in crashes where alcohol is involved today than 30 years ago. The substantial reduction in the number of people that died in alcohol-related crashes over the past 30 years is a result of numerous and persistent efforts to combat DUIs. One of the sanctions that has been used in the United States is based on the use of the ignition interlock device (IID) technology which was created in the 1960s and consists 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. If the breath sample indicates a blood alcohol concentration (BAC) higher than a pre-specified level, the vehicle will not start. As a result, IID programs were established requiring convicted DUI offenders to install ignition interlock device in their vehicle for a specific time period.

The preponderance of evidence from evaluations of the effectiveness of IID programs in numerous states in the U.S. and internationally have consistently found that IIDs are effective in reducing DUIs as long as the IID is installed in the offender's vehicle. However, after the IID has been removed, the recidivism rates tend to increase to the levels of offenders who did not install an IID (Elder et al., 2011).

California has a long history of using IIDs. It was the first state to establish and evaluate the IID intervention pilot program (EMT Group, 1990), and it was the first state to pass legislation authorizing judges to order repeat DUI offenders to install IIDs in their vehicles (Fulkerson, 2003). The last major evaluation study of California's IID program in 2005 found mixed results. The study showed IIDs can reduce subsequent DUI recidivism, but only in specific context and among specific groups of offenders. This study also indicated that IIDs can be associated with a substantial increase in crash risk, specifically among offenders who installed an IID, which makes the overall traffic safety benefit of IID devices, based on the study results, questionable (DeYoung, Tashima, & Masten, 2005).

Current Study

This study presents a general deterrence evaluation of the impact of implementing Assembly Bill (AB) 91 law. AB 91 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.

By January 1, 2015, the DMV was required to report to the Legislature on the effectiveness of the 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. The unit of analysis for this study is at the county level, meaning that inferences from this evaluation reflect whether the pilot program was associated with changes in DUI offenses at the general county level (i.e., general deterrence).

Methods

Data on all drivers convicted of a DUI offense (CVC 23152 and 23153) from July 1, 2007 through June 30, 2013 were obtained from abstracts of conviction, which are reported to DMV by all California courts (data on alcohol- or drug-reckless convictions—CVC 23103.5—were also obtained from abstracts of conviction for the same time period and were included in some of the analyses).

To differentiate between first-time and repeat violations of DUI offenses, a DUI offender level was determined for all drivers whose conviction data were included in the study. Three separate groups of DUI offenders were identified: first DUI offenders, second DUI offenders, and third-or-more DUI offenders.

The conviction data were aggregated by county (i.e., the pilot Counties of Alameda, Los Angeles, Sacramento, and Tulare and all 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 percentage of DUI offenders who installed at least one IID at some point during the 3 years after the conviction date of their DUI conviction was designated as the IID installation rate for this study. The IID installation rates were calculated monthly as the percentage 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.

The unit of analyses evaluating association of the IID pilot program with reduction in DUI offenses in the pilot counties were monthly rates of DUI convictions (and, for some analyses, rates of DUI convictions combined with alcohol- or drug-reckless convictions) per 100,000 licensed drivers age 16 or older. These rates were calculated for each pilot county and for all non-pilot counties combined.

Auto-Regressive Integrated Moving Average (ARIMA) interrupted time series analyses were used for the study. This analytical tool statistically adjusts the rates of DUI convictions before and after implementation of the pilot program for the changes observed in the non-pilot counties and other factors that may bias or contaminate a simple comparison of the rates.

Results

During the pilot period, IID installation rates increased dramatically in the pilot counties to include 42.4% of all DUI offenders combined, compared to 2.1% during the pre-pilot period. Throughout the same time period, IID installation rates among all DUI offenders in the non-pilot counties increased modestly from 2.5% to 4.3%. IID installation rates in the pilot counties were highest among first DUI offenders (46.7%), compared to lower rates among second DUI offenders (33.2%) and third-or-more DUI offenders (15.7%).

After adjusting for the change observed in the non-pilot counties and other covariates, the results of the ARIMA time series analyses showed that there were no differences in the license-based rates of DUI convictions in the pilot counties among first, second, and third-or-more DUI offenders during the pilot program as compared to the pre-pilot program. The same results were found for each individual pilot county, as well as for all four pilot counties combined.

When alcohol- or drug-reckless convictions were combined with DUI convictions, the results of the ARIMA time series analyses indicated that the license-based rates of combined DUI/ alcohol- or drug-reckless convictions in the pilot counties were found not to be different among first, second, and third-or-more DUI offenders between the pre-pilot and the pilot period. This

conclusion applies to each individual pilot county. However, when all four pilot counties were combined, the adjusted license-based rates of combined DUI/alcohol- or drug-reckless convictions among second DUI offenders were 3.7% higher during the pilot period than during the pre-pilot period. The comparison of the same rates combined across all four counties among first and third-or-more DUI offenders were not found to be different during the pilot program as compared to the pre-pilot program.

Conclusions and Recommendation

The IID pilot program implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties does not appear to be associated with a reduction in the number of first-time DUI convictions and repeat DUI offenses in the pilot counties. This finding might appear surprising considering an extensive difference found in IID installation rates among DUI offenders in pilot counties (42.4%) during the pilot period vs. those in non-pilot counties (4.3%). The main reason for a dramatic increase in IID installation rates among DUI offenders in pilot counties during the pilot period could be due to the fact that the IID pilot program is mandatory. That is, it affects all DUI offenders in pilot counties and makes IID installment for a predefined time period a condition for full license reinstatement. At the same time, other IID programs for DUI offenders in the state are optional. That is, they affect mostly repeat DUI offenders, and are a condition to obtain a restricted license while the offender is suspended or revoked rather than a condition for license reinstatement. Also, since most DUI offenders in California are first DUI offenders (74%) and since the IID installations among them accounted for 83% of the total IID installations among all DUI offenders in the pilot counties during the pilot period, the substantial increase in the IID installation rates during pilot vs. pre-pilot period and the considerable difference in the overall IID installation rates between pilot and non-pilot counties after the implementation of the AB 91 law is not surprising.

In addition, first DUI offenders have typically lower DUI recidivism rates than repeat DUI offenders (Oulad Daoud & Tashima, 2014). Therefore, the IID program may not have a general deterrent effect on these offenders. This would explain why the IID pilot program was not associated with a decrease in the number of DUI convictions in the pilot counties.

Additional evidence that the IID program may not be effective among first DUI offenders comes from the previous evaluation of the effectiveness of IIDs in California (DeYoung et al., 2005) where no difference was found in the risk of subsequent DUI recidivism between first DUI offenders who were ordered to install IID compared to those who were not.

It is unclear whether it was reasonable to expect a general deterrent effect of this IID pilot program, since there is limited research available related to this area of research (Elder et al., 2011). McCartt, Leaf, Farmer, & Eichelberger (2013) suggested that states may wish to more broadly publicize their IID program to instill among the population of drivers a greater awareness that persons convicted of DUI must install an IID and comply with other program requirements. In general, for a law to have an influence on person's behaviors, a person must believe the consequences of violating a particular law are swift, certain, and severe (Ross, 1992). This is only plausible if potential offenders are aware of the law and the potential prescribed punishment (DeYoung, 1998). It is unknown whether and to what degree this IID pilot program was advertised in the four pilot counties or whether publicizing this pilot program would have had an effect in California. In other words, if the program was advertised, it is unknown whether this effort would have been effective in reaching all potential first and repeat DUI offenders and if it would have altered their behavior. In fact, past research suggests this outcome is doubtful. Prior research studies showed that distributing information related to specific traffic safety interventions and programs was not associated with reductions in subsequent convictions and crash involvement (Anderson, 1977; Masten & Peck, 2004).

Nonetheless, it was important to evaluate whether the IID pilot program has a general deterrent effect on the population of drivers in California to assess its capacity to have an influence on "would-be" DUI offenders before they engage in dangerous drinking and driving behavior. This was especially critical knowing that the majority of California DUI offenders are first DUI offenders or those who do not have a prior DUI conviction. Also, first DUI offenders in California account for most of drivers involved in fatal alcohol- and drug-related crashes (Oulad Daoud & Tashima, 2014).

Even though the IID pilot program was not found to have a general deterrent effect on the occurrence of DUI convictions in designated pilot counties, this evaluation does not provide information about the specific deterrence effect of this pilot program. To determine if this IID pilot program is associated with changes in the specific behavior of individual drivers who were convicted of DUI subsequent to the implementation of the AB 91 law and thus were subject to the IID pilot program requirements, a separate, so called, specific deterrence evaluation needs to be conducted.

A specific deterrence evaluation will determine if there are differences in DUI recidivism and crashes between DUI offenders in the pilot counties who were subject to and comply with the IID pilot program and those who were not subject to the pilot program. Since the unit of the

analyses for this evaluation will be the individual driver level, it requires sufficient follow-up time to capture subsequent DUI convictions among different types of DUI offenders. In addition, since there is a significant delay in the availability of police reported crash involvement data for California drivers in recent years, the specific deterrence evaluation could not have been conducted at this point in time.

A specific deterrence evaluation will provide additional crucial information on the effectiveness of the IID program and the effectiveness of IID devices among California DUI offenders, as designed under the AB 91 law. It is therefore recommended that subsequent legislative action take into consideration the findings of the specific deterrence evaluation of this pilot program. This evaluation is anticipated to be completed in the fall of 2015.

TABLE OF CONTENTS

	<u>PAGE</u>
PREFACE	i
ACKNOWLEDGMENTS	iii
EXECUTIVE SUMMARY	v
INTRODUCTION	1
Recent Trends in Use and Evaluations of IID Programs	1
History of IID Programs in California	4
Evaluation Objective	7
METHOD	9
Data Sources and Coding Procedures	9
Analytic Method	10
RESULTS	13
Description of IID Installations	13
Description of DUI and Alcohol- or Drug-Reckless Convictions	16
Question 1: What are the Rates of DUI Convictions among First DUI Offenders?	19
Question 2: What are the Rates of DUI Convictions among Second DUI Offenders?	23
Question 3: What are the Rates of DUI Convictions among Third-or-More DUI Offenders?	27
Question 4: What are the Rates of DUI Convictions Combined with Alcohol- or Drug-Reckless Convictions among First Offenders?	31
Question 5: What are the Rates of DUI Convictions Combined with Alcohol- or Drug-Reckless Convictions among Second Offenders?	35
Question 6: What are the Rates of DUI Convictions Combined with Alcohol- or Drug-Reckless Convictions among Third-or-More Offenders?	40
DISCUSSION	45
General Discussion of Findings	45
Limitations	47
Conclusion and Recommendation	48
REFERENCES	51
APPENDIX	53

TABLE OF CONTENTS (continued)

LIST OF TABLES

<u>NUMBER</u>		<u>PAGE</u>
1	IID Installations in the IID Pilot Counties by DUI Offender Level, July 2007–June 2013.....	13
2	DUI and Alcohol- or Drug-Reckless Convictions in the IID Pilot Counties by Offender Status, July 2007–June 2013	18
3	Unadjusted Rates of DUI Convictions among First DUI Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013	22
4	Unadjusted Rates of DUI Convictions among Second DUI Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013	26
5	Unadjusted Rates of DUI Convictions among Third-or-More DUI Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013	30
6	Unadjusted Rates of DUI/Alcohol- or Drug-Reckless Convictions (Combined) among First Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013	35
7	Unadjusted Rates of DUI/Alcohol- or Drug-Reckless Convictions (Combined) among Second Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013	39
8	Unadjusted Rates of DUI/Alcohol- or Drug-Reckless Convictions (Combined) among Third-or-More Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013.....	44

TABLE OF CONTENTS (continued)

LIST OF FIGURES

<u>NUMBER</u>	<u>PAGE</u>
1 IID installations in the pilot counties among all DUI offenders by county, July 2007– June 2013	14
2 IID installations in the pilot counties among first DUI offenders by county, July 2007–June 2013	14
3 IID installations in the pilot counties among second DUI offenders by county, July 2007–June 2013	15
4 IID installations in the pilot counties among third-or-more DUI offenders by county, July 2007–June 2013.....	15
5 Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.....	19
6 Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013	20
7 Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013	20
8 Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.....	21
9 Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013	21
10 Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.....	23
11 Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013	24
12 Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013	24
13 Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.....	25

TABLE OF CONTENTS (continued)

LIST OF FIGURES (continued)

<u>NUMBER</u>	<u>PAGE</u>
14 Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013	25
15 Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.....	27
16 Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013	28
17 Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013	28
18 Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.....	29
19 Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013	29
20 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013	32
21 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.....	32
22 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.....	33
23 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.....	33
24 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013	34

TABLE OF CONTENTS (continued)

LIST OF FIGURES (continued)

<u>NUMBER</u>	<u>PAGE</u>
25 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.....	36
26 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.....	36
27 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013	37
28 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013	37
29 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.....	38
30 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013	41
31 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013	41
32 Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013	42

TABLE OF CONTENTS (continued)

LIST OF FIGURES (continued)

<u>NUMBER</u>		<u>PAGE</u>
33	Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013	42
34	Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013	43

INTRODUCTION

Driving under the influence (DUI) of alcohol continues to be a major threat to traffic safety, although considerably less people are dying in crashes where alcohol is involved today than 30 years ago. 10,322 people died in alcohol-involved crashes in 2012, which is about a half of the 21,113 who died in 1982 in such crashes. Nonetheless, the percentage of alcohol-involved crash fatalities of the total number of crash fatalities continues to be relatively stable over the past 15 years ranging between 30 and 32 percent (United States Government Accountability Office, 2014). Similar trends are seen in California. While the number of alcohol-involved crash fatalities declined from 2,607 in 1984 to 1,169 in 2012, the percentage of alcohol-involved crash fatalities of the total number of crash fatalities increased over the past 15 years, from 31.0% to 39.0% (Tashima & Helander, 1996; 2005; Oulad Daoud & Tashima, 2014).

The substantial reduction in the number of people that died in alcohol-related crashes over the past 30 years is a result of numerous and persistent efforts to combat DUIs. Most of these efforts have translated into a set of sanctions and penalties aimed at preventing drivers arrested or convicted of DUI from engaging in the same behavior following the initial incident. One of the sanctions that has been used in the United States (U.S.) is based on the use of the ignition interlock device (IID) technology which was created in the 1960s and consists 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. If the breath sample indicates a blood alcohol concentration (BAC) higher than a pre-specified level, the vehicle will not start. As a result, IID programs were established requiring 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 number of IID programs, with variations in their designs and specifics of their implementation, have increased considerably over time in the U.S. and internationally. In the early days, most of these programs were discretionary and administered through the courts. At some point, the authority to oversee and administer IID programs in the U.S. started shifting from judicial systems to driver licensing systems, while some states opted for a “hybrid approach” that integrates components of both systems (United States Government Accountability Office, 2014). The technology of IID devices also improved greatly over time to prevent potential circumvention. Nonetheless, these devices remains susceptible to bypassing efforts,

some of which are very simple, such as driving another vehicle without an IID (DeYoung, Tashima, & Masten, 2005).

Although there is variability in how IID programs have been implemented, the majority of existing programs have focused from the beginning on repeat DUI offenders (with at least one prior DUI conviction) since these drivers have demonstrated an inability to change their drinking and driving behavior (Marques, Voas, Roth, & Tippetts, 2010). However, there have been some efforts to use IID programs for first DUI offenders. One such effort was investigated in a recent evaluation which attempted to determine the traffic safety benefits of applying certain IID legislations in Washington State affecting first DUI offenders that were implemented in 2003 and 2004 (McCartt, Leaf, Farmer, & Eichelberger, 2013). The first law change, implemented in 2003, transferred the IID orders issuance from the courts to the driver licensing department. The second law change, implemented in 2004, extended the issuance of IID orders from first 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. Ultimately, only one-third of these 'simple' first DUI offenders installed an IID following this change (these offenders could choose not to install IID and to be suspended for the 1-year period and then apply for license reinstatement). The effects of the law changes on recidivism were examined comparing the recidivism rates of the offenders who installed an IID with the rates of those who did not. Recidivism rates for the 6-month, 1-year, 2-year, and 3-year time periods following arrest were examined. The results indicated that the two law changes were not significantly associated with recidivism rates for any time period except for the 2-year period. Cumulative recidivism rates of first 'simple' DUI offenders who installed an IID decreased by an estimated 12% in the 2-year time period, while all first offenders ('simple', 'high BAC', and 'test refusal' first DUI offenders combined) who installed an IID had an 11% lower recidivism rate in the same time period than those who did not install an IID. The authors of the study suggested that if the IID installation rates had been higher among these offenders, a decline in recidivism rates could have been much greater. Specifically, if all first 'simple' DUI offenders had installed an IID instead of only one-third of them, the recidivism rates could have been 50% lower. The study also found an 8% reduction in single-vehicle late-night crashes associated with the 2004 legislative change. In January 2011, orders to install an IID were made mandatory in the state by requiring that the order be lifted only after the driver had an interlock installed for at least the last 4 months of their interlock period (without any reports of noncompliance).

Researchers have found, in previous evaluations, that when DUI offenders who are ordered to install an IID have an alternative option they will choose that option (for example, if they can be

exempted from the IID requirement by claiming to not own a vehicle or if they can opt to serve a full suspension period rather than to have an IID restricted license). Some of the latter might even risk driving on a suspended/revoked license (Elder et al., 2011; Marques et al., 2010; Voas, Tippetts, & Grosz, 2013). Some states have implemented mandatory IID programs that required DUI offenders to install an IID for a specified period as a requirement for full reinstatement of their driver's license. Other states attempted to enhance the compliance with the IID order by requiring use of specific "less desirable" alternative sanctions that are used if the DUI offender does not want to comply with the IID order. Examples of such mandatory IID programs that were recently evaluated can be found in New Mexico and Florida (Marques et al., 2010; Voas et al., 2013).

In New Mexico, one county was able to effectively mandate IID installation for all first and repeat DUI offenders, by getting all Santa Fe County magistrate judges to agree to require an interlock, with "required house arrest ... as an alternative for those who claimed to have given up driving or otherwise could not install an interlock" (Marques et al., 2010, p. 71). With house arrest as the alternate option for offenders, Santa Fe County achieved a 71% installation rate during the 2-year period under the IID program affecting all DUI offenders, which is much higher than the 13% 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 offenders who did not install an IID. 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.

In 2002, Florida implemented the administrative reinstatement interlock program (ARIP), which requires persons convicted of DUI to install an IID for a pre-specified period of time as a prerequisite for license reinstatement. This program applies to all repeat DUI offenders, first DUI offenders with a BAC of 0.20% or higher, and first DUI offenders who had a minor in the vehicle when arrested. 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 also indicated that 47.7% of first DUI offenders, 59.6% of second, and 55.4% 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, the preponderance of evidence from evaluations of the effectiveness of IID programs in numerous states in the U.S. and internationally have consistently found that IIDs are effective in reducing DUIs as long as the IID is installed in the offender's vehicle. However, after the IID has been removed, the recidivism rates tend to increase to the levels of offenders who did not install an IID (Elder et al., 2011).

History of IID Programs in California

California has a long history of using IIDs. It was the first state to establish and evaluate the IID intervention pilot program (EMT Group, 1990) and the first state to pass legislation authorizing 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 but shortly after it became obvious that judges were not sentencing most qualified repeat DUI offenders with the IID installment requirement. Therefore, the follow-up legislation was enacted in 1993. Assembly Bill 2851 (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). However, judges continued not to require interlocks for these offenders. This information is tracked and presented, from the beginning of AB 2851 enactment until present, in the annual report of the California DUI Management Information System and 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 & Tashima, 2014).

In 1999, new legislation was implemented, AB 762, which overturned the previous IID law and added new provisions. The principal implication of AB 762 was a transfer in the focus from repeat DUI offenders to persons convicted of driving while suspended (DWS) for DUI conviction (those who violated California Vehicle Code [CVC] Section 14601.2). 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. Presumably, these offenders proved they present a risk to others on roads since they were caught while driving on a suspended or revoked license for a DUI offense, which made them the next logical candidates for a mandatory IID law (DeYoung et al., 2005).

In addition, AB 762 legislation provided incentives for repeat DUI offenders to reinstate early if they install an IID. Furthermore, this law encouraged judges to use earlier established 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 law also required the Department of Motor Vehicles (DMV) to conduct the evaluation of the implementation of IID laws in California and the evaluation of the effectiveness of AB 762 legislation 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. Since the legislation required the use of IIDs in various contexts and among different types of offenders, the effectiveness evaluation study was comprised of six smaller studies where each study examined the effectiveness of IIDs in a different situation among either DWS for DUI offenders or DUI offenders (DeYoung et al., 2005). Four of the six studies evaluated the California IID program administered through a court order to install an IID or through a restriction to drive only a vehicle equipped with an IID, while the other two studies focused on the effectiveness of IIDs among only 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 of the 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 was not statistically different from those who did not receive the same IID court 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 involved both persons convicted of driving while suspended for DUI and DUI offenders who installed an IID in their vehicles. These two types of offenders had significantly lower DUI recidivism (18%) 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 results of the evaluation among first DUI offenders, all of whom had elevated BAC level or other aggravating factors, indicated that IID court order or restriction is not associated with reductions in their subsequent DUI recidivism or crashes, which indicated that the IID program was not effective among first DUI offenders. When the relationship between IID court order or restriction and subsequent DUI conviction was examined among second DUI offenders, no significant difference was found between second DUI offenders in the IID group (IID order or restriction) and those in the comparison group. However, second DUI offenders in the IID group had 13% lower risk of subsequent DUI incidents and 19% lower risk of subsequent crash than second DUI offenders in the comparison group. Finally, the results for second DUI offenders who installed an IID after serving half of their suspension in order to obtain a restricted license indicated that these offenders had different subsequent DUI recidivism and crash risk when compared to second DUI offenders who remained suspended. The statistical analyses 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.

As DeYoung et al. (2005) pointed out, their study results are mixed. The study showed IIDs can reduce subsequent DUI recidivism but only in specific context and among specific groups of offenders. At the same time, this study indicated that IIDs can be associated with a substantial increase in crash risk, specifically 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's 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 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 SB 598 law including the installation of an IID.

Evaluation Objective

This study presents a general deterrence evaluation of the impact of implementing AB 91 law (see Appendix). AB 91 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 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 specific federal poverty level, the IID providers are responsible for absorbing the 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 before they were approved.

By January 1, 2015, the DMV was required to report to the Legislature 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.” The study presented in this report was completed to fulfill the department’s obligation under the AB 91 legislation to evaluate the effectiveness of the 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. The unit of analysis for this study is at the county level, meaning that inferences from this evaluation reflect whether the pilot program was associated with changes in DUI offenses at the general county level (i.e., general deterrence) rather than at the level of the individual driver (i.e., specific deterrence).

METHOD

Data Sources and Coding Procedures

Data on all drivers convicted of a DUI offense (CVC 23152 and 23153) from July 1, 2007 to June 30, 2013 were obtained from abstracts of conviction, which are reported to DMV by all California courts. This time period provided 3 years of conviction data both before (July 2007–June 2010) and after (July 2010–June 2013) the pilot program was implemented, and also allowed all offenders to have at least 10 months of follow-up time from their arrest date to the date of data extraction in April 2014.

Data on alcohol-or drug-related reckless driving offenses (CVC 23103.5) from July 1, 2007 to June 30, 2013 were also obtained from the same data source. These convictions were included in some analyses that combined alcohol- or drug-related reckless with DUI convictions to account for all DUI-related offenses. Namely, the same event initiated both DUI and alcohol- or drug-related reckless driving convictions; a person was arrested for driving under the influence of alcohol and/or drugs. However, in the case of an alcohol- or drug-related reckless driving offense, a person was offered to plea down to an alcohol- or drug-reckless conviction rather than being convicted of a DUI offense. Offenders who are convicted of an alcohol- or drug-reckless offense are not subject to the same sanctions and penalties as DUI offenders and are not required to install an IID as part of this pilot program.

DUI offender level was determined for all drivers whose conviction data were included in the study, to differentiate between first-time and repeat violations of DUI offenses. Drivers who did not have a conviction considered as prior for DUI, as defined under the CVC Sections 23536 - 23568, within 10 years from the violation date of their current DUI conviction, were categorized as first DUI offenders. Drivers convicted of DUI with one conviction considered as prior for 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 DUI with two or more DUI priors, within 10 years from the violation date of their current DUI conviction, were identified as third-or-more DUI offenders.

The conviction data were aggregated by county (i.e., the pilot Counties of Alameda, Los Angeles, Sacramento, and Tulare and all 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). Monthly licensed-based rates of convictions per 100,000 drivers age 16 or older were calculated using biannual (January and July) total counts of licensed drivers in each California county, as obtained from DMV's State Age and Sex Report (DMV, 2007–2013). Monthly county-specific population estimates were interpolated between the biannual total counts of licensed drivers, assuming linear month-to-month changes in licensees (i.e., 1/6th of the change between any two successive biannual total counts of licensed drivers occurred each month).

The percentage of DUI offenders who installed at least one IID at some point during the 3 years after the conviction date of their DUI conviction was designated as the IID installation rate for this study. For drivers convicted during the pilot period (July 2010–June 2013), the post-conviction follow-up time ranged from 10 months (for drivers convicted in June 2013), to 3 years (for drivers convicted in July 2010). For those convicted during the pre-pilot period (July 2007–June 2010), the post-conviction follow-up period was 3 years. The IID installation rates were calculated monthly as the percentage of convicted DUI offenders, per their violation month, separately for each pilot county and for all non-pilot counties combined, who submitted an IID installation form to the DMV during the 3 year post-conviction follow-up period. Alcohol- or drug-reckless offenders were not included in the IID installation rates calculations because they were not required to install ignition interlock devices under the pilot program.

Analytic Method

To determine whether there were reliable changes in the rates of DUI and combined DUI/alcohol- or drug-reckless convictions in the four pilot counties associated with implementing the IID pilot program in July 2010, Auto-Regressive Integrated Moving Average (ARIMA) interrupted time series analysis was used to model the monthly per 100,000 licensed driver rates of the abovementioned convictions from July 2007 through June 2013. ARIMA models apply an autoregressive moving average to find the best fit to past values of a time series (Box & Jenkins, 1970; Box & Tiao, 1975). The reason ARIMA was chosen as the analytical tool is that such inferential statistical analysis adjusts the rates before and after implementation of the pilot program for the changes observed in the non-pilot counties and other factors that may bias or contaminate a simple comparison of the rates. In other words, such a technique allows one to answer the question “with all else being equal in the pilot versus non-pilot counties, are there any

differences in the license-based rates of DUI convictions associated with implementation of the IID program?” Using this analytic method, the monthly license-based rates of convictions were first statistically adjusted for any preexisting secular trends, autocorrelation, and historical variations, prior to estimating any changes associated with implementing the IID pilot program. Individual ARIMA models were conducted for each of the pilot counties, as well as for all four pilot counties combined. Analyses were conducted separately for the license-based rates of DUI convictions, and DUI/alcohol- or drug-reckless convictions combined. In addition, separate analyses were conducted for first, second, and third-or-more DUI offender levels. The statistical significance of each final ARIMA model was determined with a two tailed alpha level of .05 (i.e., less than a 5% probability of being found significant due to chance).

The per 100,000 licensed driver rates of DUI convictions and DUI convictions combined with alcohol- or drug-reckless convictions in the non-pilot counties were included as a covariate in the respective analyses. Including the non-pilot counties rates was done to further control for other factors (e.g., weather, fuel prices, and general economic factors) that may affect the rates of convictions either directly or by altering exposure. The inclusion of the non-pilot rates also served as a counterfactual of the expected change in these rates in the pilot counties had the pilot program not been implemented (Liu, 2006). Two additional covariates were included in the ARIMA models to adjust for confounding due to economic factors that might affect driving exposure: (a) the U.S. average monthly retail price per gallon of gasoline (U.S. Energy Information Administration, 2014) and (b) the monthly California unemployment rate (Bureau of Labor Statistics, 2014).

The implementation of the IID pilot program was modeled as a sudden-permanent intervention, which only required one ARIMA parameter (ω) to be estimated (Yaffee, 2000). Because month-to-month variability in the license-based rates of convictions (DUI, alcohol- or drug-reckless, and combined DUI/alcohol- or drug-reckless convictions) was not consistent across the study period, the natural logarithms of these rates were analyzed. This transformation increases variance stationarity (i.e., equalizes month-to-month variation), improves accuracy of parameter estimates, and reduces the biasing influence of outliers. Using log-transformed data also allows the ARIMA parameter for the intervention to be interpreted as the additive percentage change ($\Delta\%$) in the conviction series associated with the intervention using the formula $(e^\omega - 1) \times 100$, where ω represents the intervention parameter from the ARIMA model (McCleary & Hay, 1980; McDowall, McCleary, Meidinger, & Hay, 1980).

Most of the models of the license-based rates of convictions had simple ARIMA structures involving either first-order (lag 1 or 2) or seasonal (12 month) auto-regressive or moving average terms. All autoregressive and moving average terms in the final models were within the bounds of stationarity and invertibility, meaning that they had absolute values less than 1.0 and were mathematically stable (Yaffee, 2000). The covariate series and intervention parameters were retained in the models, regardless of their level of statistical significance, because the analyses were intended to test hypotheses about the effects of the IID pilot program rather than build parsimonious models. Joint estimation of model parameters and outlier effects was used during the analyses to further reduce the impact of outliers and other anomalies (Chen & Liu, 1993). The final models were those that best represented the license-based rates of convictions (DUI, alcohol- or drug-reckless, and combined DUI/alcohol- or drug-reckless) for each county, and for all four pilot counties combined, as determined by the best-fitting auto-correlation and partial-auto-correlation functions of the series residuals (Liu, 2006). The results of the ARIMA analyses provided county-specific estimates of monthly changes in the license-based rates of convictions associated with implementing the IID pilot program. This approach will provide information necessary to determine the effectiveness of the AB 91 pilot program in reducing the number of first and repeat DUI offenses in the four pilot counties (i.e., general deterrence). However, it cannot provide information to determine the effectiveness of the pilot program at curbing individual recidivism (i.e., specific deterrence).

RESULTS

Description of IID Installations

Table 1 shows the numbers of DUI offenders who installed at least one IID at any point in time during their post-conviction follow-up period (maximum of 3 years), as well as the IID installation rates among convicted DUI offenders, by county and DUI offender level. The IID installation rates by violation month are illustrated in Figures 1-4 as a function of DUI offender level and county.

Table 1

IID Installations in the IID Pilot Counties by DUI Offender Level, July 2007–June 2013

County	DUI offender level							
	1 st		2 nd		3 rd or higher		Total	
	Count	%	Count	%	Count	%	Count	%
Pre-pilot								
All pilot counties	846	0.8	1,132	4.3	1,004	12.1	2,982	2.1
Alameda	83	0.7	182	4.9	106	8.8	371	2.1
Los Angeles	568	0.8	659	4.1	670	15.4	1,897	2.0
Sacramento	154	1.0	242	5.4	184	10.0	580	2.7
Tulare	41	0.7	49	2.5	44	4.7	134	1.4
Non-pilot counties	1,502	0.6	4,013	5.6	3,333	13.3	8,848	2.5
Total	2,348	0.7	5,145	5.3	4,337	13.0	11,830	2.4
Pilot								
All pilot counties	42,491	46.7	7,444	33.2	1,041	15.7	50,976	42.4
Alameda	4,254	43.7	842	27.5	117	11.7	5,213	37.8
Los Angeles	30,602	48.0	5,276	37.6	683	19.8	36,561	45.0
Sacramento	5,833	47.3	1,052	28.0	191	12.8	7,076	40.2
Tulare	1,802	34.3	274	17.8	50	7.0	2,126	28.4
Non-pilot counties	1,083	0.5	8,469	14.9	2,341	12.4	11,893	4.3
Total	43,574	14.8	15,913	20.1	3,382	13.2	62,869	15.8

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). Alcohol- or drug-reckless offenders are not included in the installation counts or denominator for the percentage because only DUI offenders were subject to the IID pilot program. Installations were only counted if the IID was installed within 3 years subsequent to DUI conviction. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013.

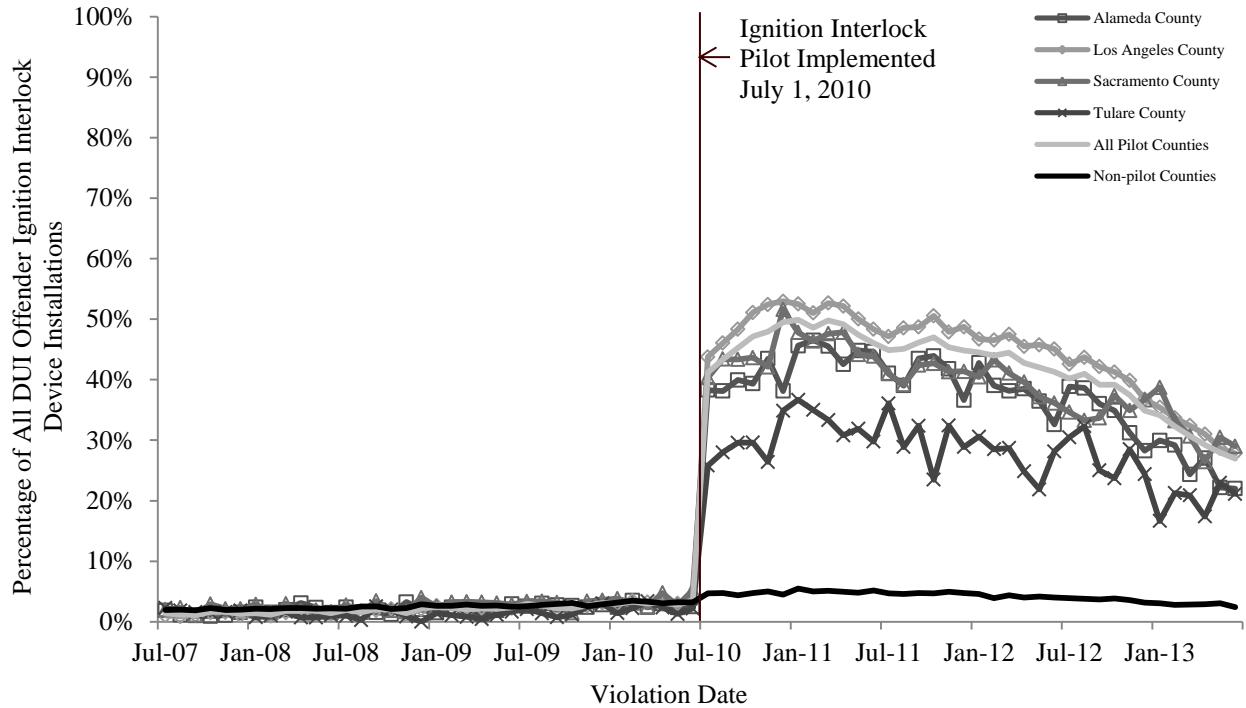


Figure 1. IID installations in the pilot counties among all DUI offenders by county, July 2007–June 2013.

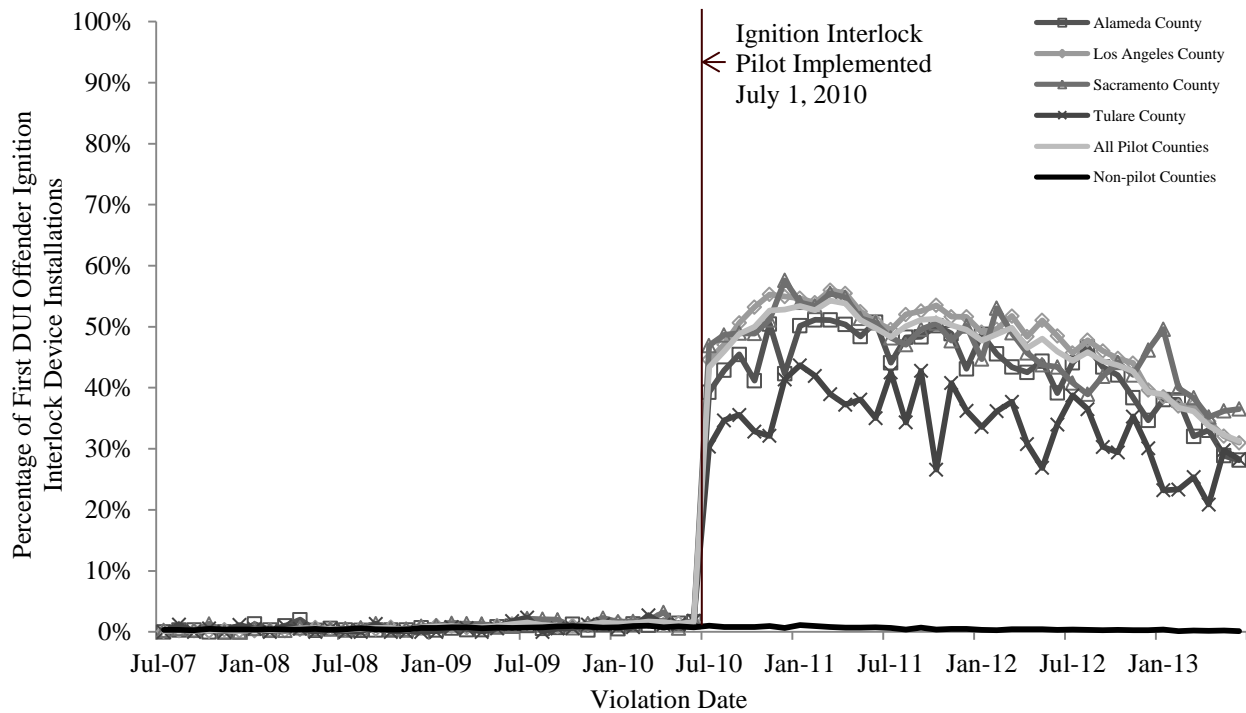


Figure 2. IID installations in the pilot counties among first DUI offenders by county, July 2007–June 2013.

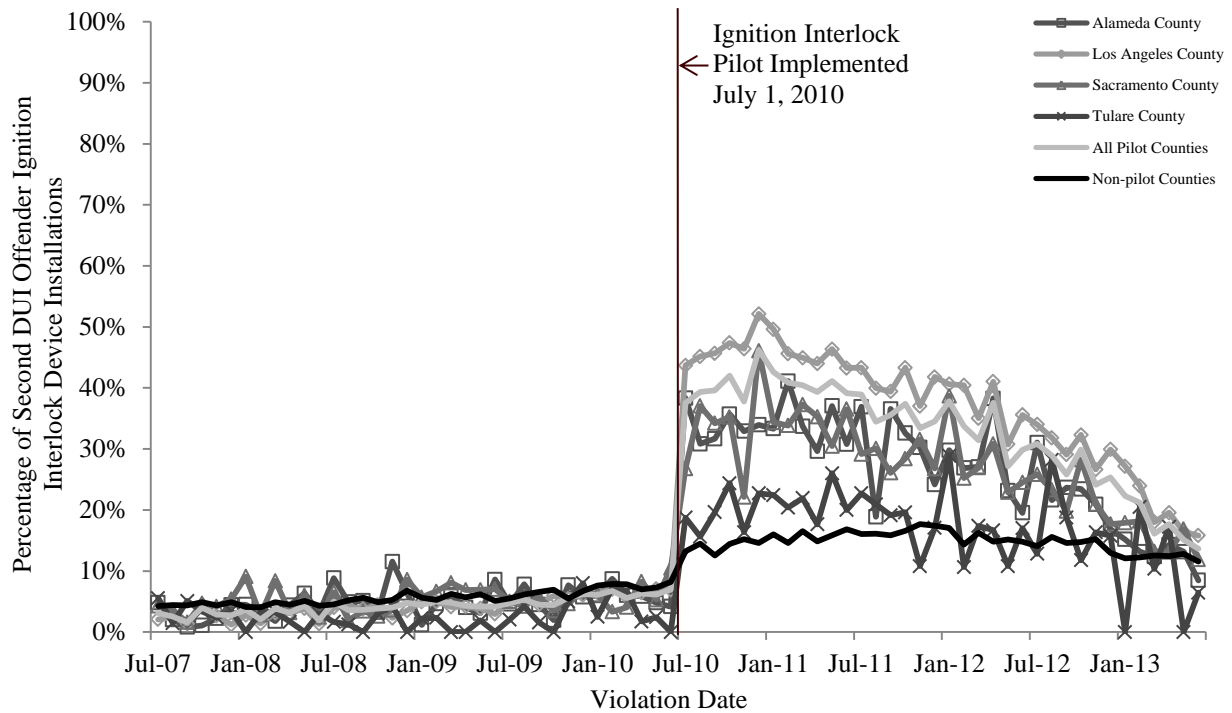


Figure 3. IID installations in the pilot counties among second DUI offenders by county, July 2007–June 2013.

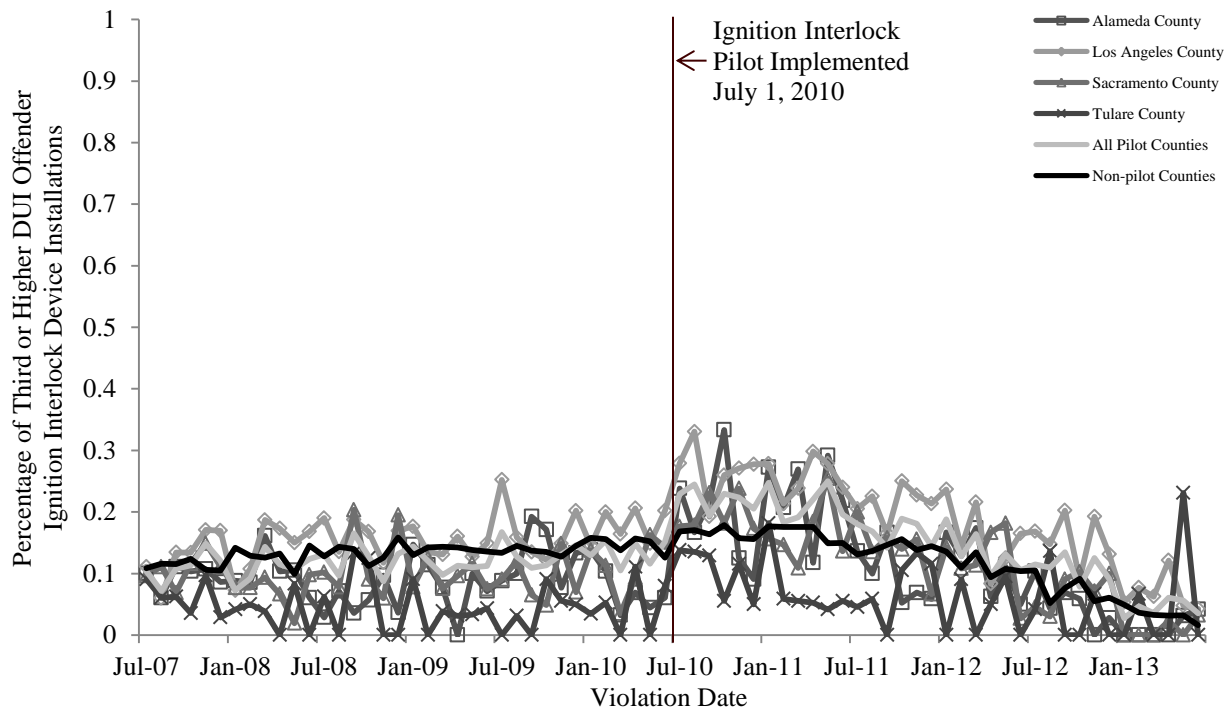


Figure 4. IID installations in the pilot counties among third-or-more DUI offenders by county, July 2007–June 2013.

IID installation rates among DUI offenders were very low in the pre-pilot period in both the pilot and non-pilot counties. 2.1% of DUI offenders combined across all offender levels in the pilot counties and 2.5% those in the non-pilot counties installed an IID during the pre-pilot period.

During the pilot period, IID installation rates increased dramatically in the pilot counties to include 42.4% of all DUI offenders combined. In the non-pilot counties, the installation rate increased modestly to 4.3% among all DUI offenders, largely due to increased installations among second DUI offenders. This was probably because of a law change (Senate Bill 598) contemporaneous to the IID pilot program that allowed for statewide earlier license restriction for second and third DUI offenders convicted of alcohol-only misdemeanor DUI convictions if they installed an ignition interlock device. IID installation rates in the pilot counties were highest among first DUI offenders (46.7%), compared to lower rates among second DUI offenders (33.2%) and three-or-more DUI offenders (15.7%). This is likely a reflection of the 1) new component of this IID pilot program, which for the first time requires all first DUI offenders in the pilot counties to install an IID subsequent to their DUI conviction, 2) substantially shorter suspension periods for first time DUI offenders (6 months) than for repeat DUI offenders (minimum of 24 months)—this allowed for greater amount of time during their post-conviction follow-up to detect their IID installations, and 3) longer suspension periods for second and third-or-more DUI offenders. This resulted in a shorter post-conviction follow-up to capture IID installations for a considerable portion of repeat DUI offenders.

As can be seen in Figures 1-4, it appears that the IID installation rates are decreasing over time for all DUI offender levels. However, this decline is merely a byproduct of having a shorter follow-up period for DUI offenders whose violation date occurred later in the pilot period (e.g., in June 2013) and who only had a 10 month post-conviction follow-up. Given the shorter amount of post-conviction follow-up, the IID installation rates during the pilot period for all DUI offender levels, but particularly among second and third-or-more DUI offenders, would be expected to increase over time if followed for an extended time period.

Description of DUI and Alcohol- or Drug-Reckless Convictions

Table 2 presents counts of DUI and alcohol- or drug-reckless convictions in the four pilot counties and in the combined non-pilot counties during the pre-pilot (July 2007–June 2010) and pilot (July 2010–June 2013) periods. These conviction counts are presented by number of DUI prior convictions (determined, as mentioned above, according to CVC Sections 23536 - 23568) in order to differentiate between first-time and repeat offenses. As noted above, alcohol- or

drug-reckless convictions are included because persons convicted of those were originally arrested for DUI, but subsequently allowed to plea to a less punitive alcohol- or drug-reckless conviction. Total DUI convictions decreased 14.9% in the pilot counties, and 20.5% in the non-pilot counties, during the pilot period. However, whereas total alcohol- or drug-reckless convictions increased 16.8% in the pilot counties during the pilot period, they decreased 14.4% in the non-pilot counties during this same timeframe. Overall, combined DUI/alcohol- or drug-reckless convictions decreased 11.9% in the pilot counties and 19.8% in the non-pilot counties during the pilot period. The results presented in Table 2 are descriptive only and are not adjusted for any covariates and/or trends that would allow for any conclusive evidence of a positive or negative relationship between IID and the conviction criteria. The rigorous and more conclusive results will follow in subsequent sections.

During the pre-pilot period, alcohol- or drug-reckless convictions accounted for 9.5% of the total number of combined DUI and alcohol- or drug-reckless convictions in the pilot counties. However, alcohol- or drug-reckless convictions accounted for 12.6% of the combined total of DUI and alcohol- or drug-reckless convictions (a 32.6% increase) in the pilot counties during the pilot period. The percentage of alcohol- or drug-reckless convictions of the same total also increased in the non-pilot counties, during the same time period, but to a lesser degree (a 6.5% increase).

Table 2
 DUI and Alcohol- or Drug-Reckless Convictions in the IID Pilot Counties by Offender Status, July 2007–June 2013

County	Conviction type and offender status										DUI/alcohol- or drug-reckless combined across all offender levels
	DUI					Alcohol- or drug-reckless					
	1 st	2 nd	3 rd or higher	Total	1 st	2 nd	3 rd or higher	Total			
Pre-pilot											
All pilot counties	106,600	26,231	8,322	141,153	13,493	1,190	155	14,838	155,991		
Alameda	12,625	3,715	1,204	17,544	2,964	232	25	3,221	20,765		
Los Angeles	72,782	15,993	4,341	93,116	8,518	777	104	9,399	102,515		
Sacramento	14,841	4,522	1,849	21,212	1,698	128	11	1,837	23,049		
Tulare	6,352	2,001	928	9,281	313	53	15	381	9,662		
Non-pilot counties	253,835	71,250	25,131	350,216	37,699	3,786	582	42,067	392,283		
Total	360,435	97,481	33,453	491,369	51,192	4,976	737	56,905	648,274		
Pilot											
All pilot counties	91,037	22,413	6,650	120,100	15,912	1,286	130	17,328	137,428		
Alameda	9,738	3,067	1,000	13,805	3,528	276	28	3,832	17,637		
Los Angeles	63,717	14,042	3,448	81,207	10,128	764	79	10,971	92,178		
Sacramento	12,335	3,764	1,491	17,590	1,835	173	11	2,019	19,609		
Tulare	5,247	1,540	711	7,498	421	73	12	506	8,004		
Non-pilot counties	202,605	56,911	18,929	278,445	32,769	2,768	452	35,989	314,434		
Total	293,642	79,324	25,579	398,545	48,681	4,054	582	53,317	451,862		

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). Alcohol- or drug-reckless = Plea down from DUI (California Vehicle Code 23103). Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013.

Question 1: What are the Rates of DUI Convictions among First DUI Offenders?

To examine whether the implementation of the IID pilot program was associated with a reduction in the number of first-time DUI violations in the pilot counties, ARIMA models were used to compare the rates of these types of violations during the pre-pilot and the pilot program. The unadjusted monthly license-based rates (per 100,000 licensed drivers) of DUI convictions among first DUI offenders before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—are illustrated in Figures 5–9. The vertical line in the figures indicates the implementation date of the IID pilot in the participating counties.

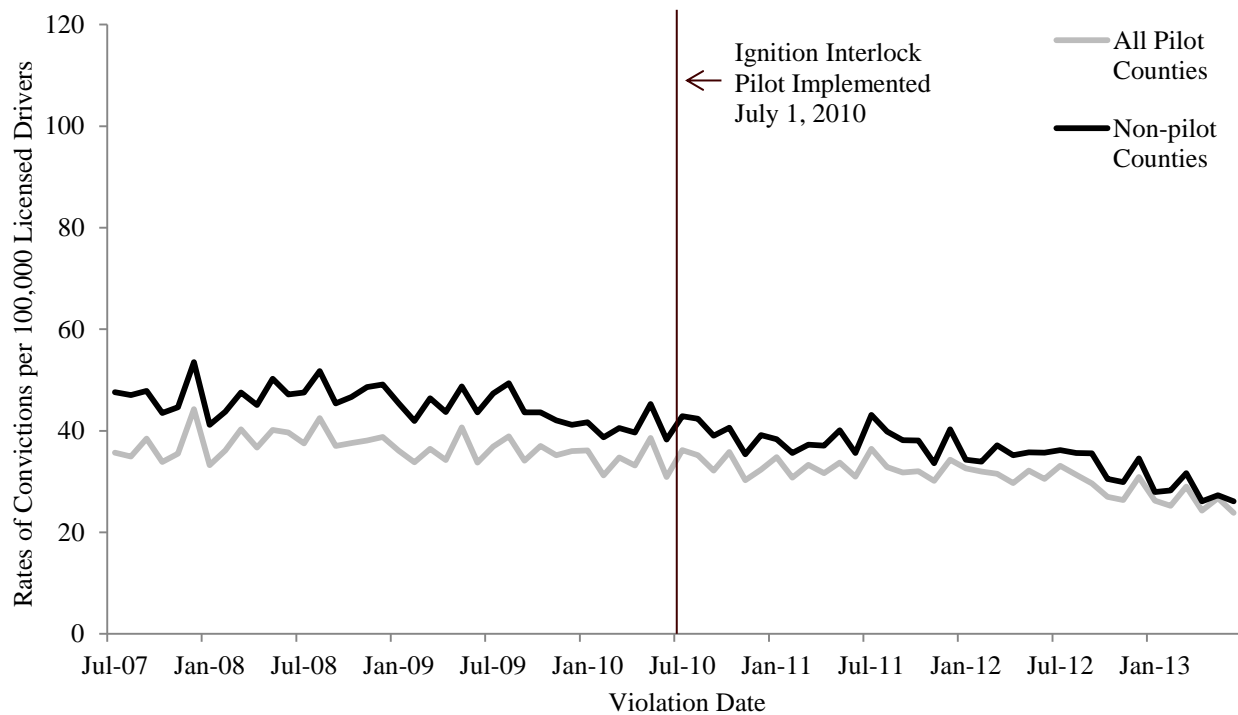


Figure 5. Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.

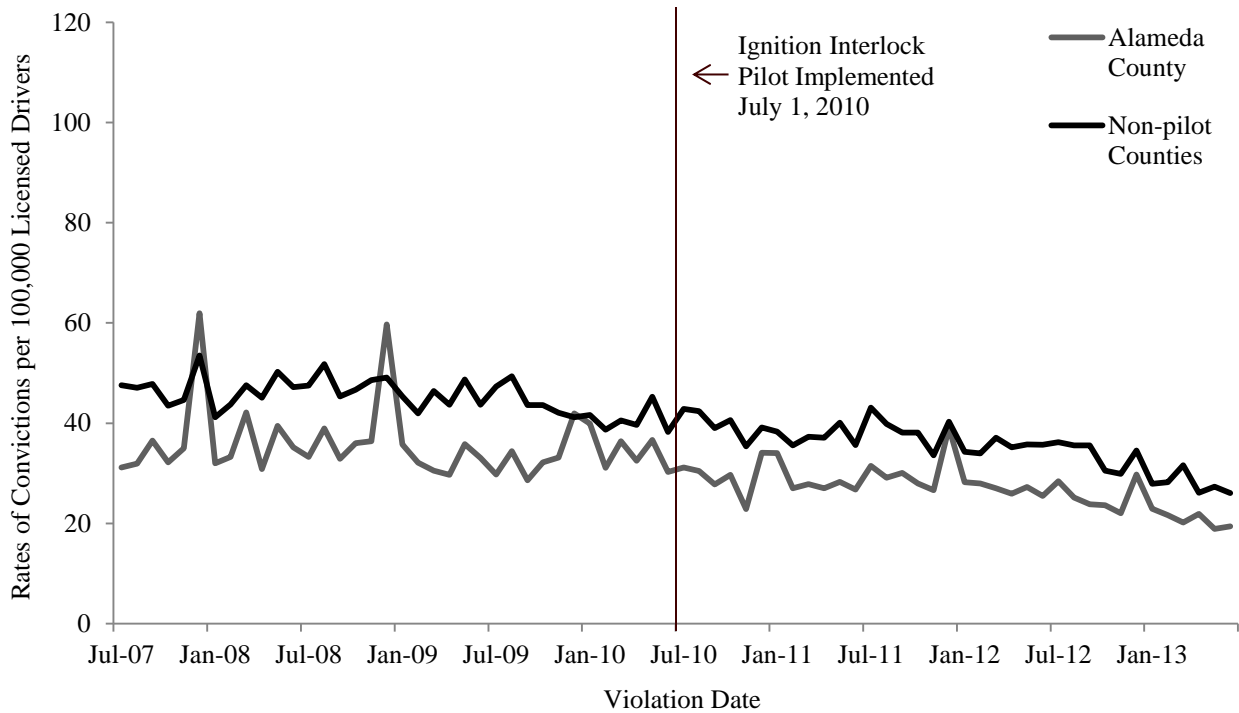


Figure 6. Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.

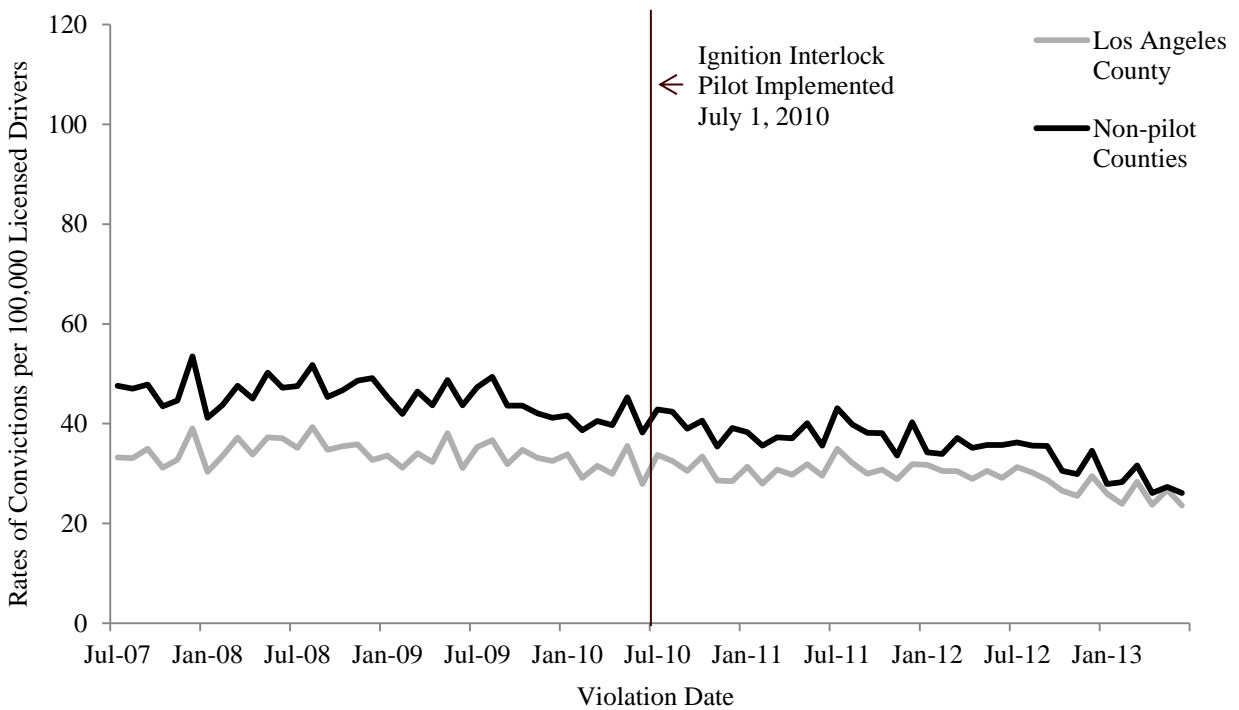


Figure 7. Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.

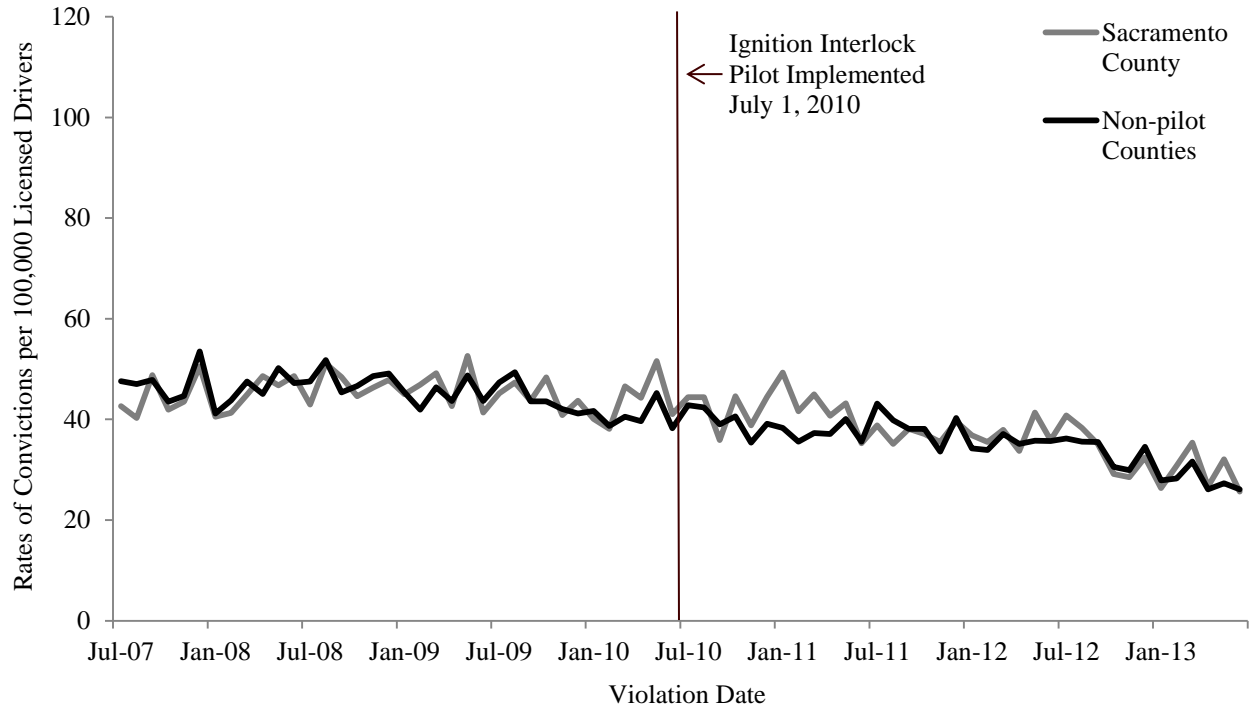


Figure 8. Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.

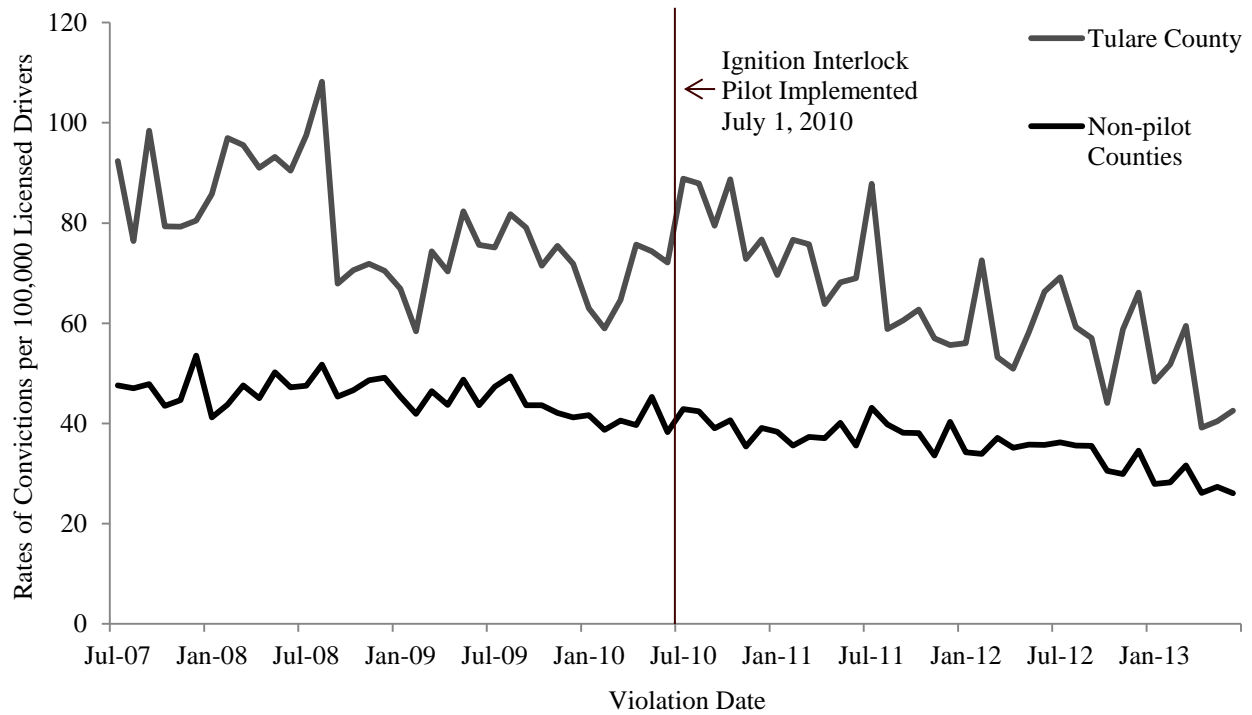


Figure 9. Unadjusted rates of DUI convictions among first DUI offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.

The unadjusted license-based rates of DUI convictions among first DUI offenders before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—and the adjusted ARIMA results are shown in Table 3. The first-time DUI violations measured as rates of DUI convictions per 100,000 licensed drivers among first DUI offenders decreased in all four pilot counties after the implementation of the IID pilot program, with a 15.3% decrease combined across all four pilot counties. However, the license-based rates of DUI convictions among first DUI offenders also decreased 21.6% combined across the non-pilot counties during the same time period. After adjusting for the change observed in the non-pilot counties, as well as the other covariates intended to adjust for changes in driving exposure in general, the rates of DUI convictions among first DUI offenders in the pilot counties were found not to be different during the pilot program as compared to the pre-pilot period. This was the case for each individual pilot county (Alameda: $\omega = -0.0111$, $t = -0.39$; Los Angeles: $\omega = 0.0130$, $t = 0.79$; Sacramento: $\omega = 0.0187$, $t = 0.69$; Tulare: $\omega = 0.0543$, $t = 0.91$), as well as for all four pilot counties combined ($\omega = 0.0083$, $t = 0.65$).

Table 3

Unadjusted Rates of DUI Convictions among First DUI Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013

County	Unadjusted rate				Adjusted ARIMA results					
	Pre-pilot	Pilot	Δ	$\Delta\%$	ω	SE_{ω}	t	$\Delta\%$	95% $CI_{\Delta\%}$	
All pilot counties	36.6	31.0	-5.6	-15.3	0.0083	0.0129	0.65	0.8	-1.7	3.4
Alameda	35.6	27.0	-8.7	-24.3	-0.0111	0.0284	-0.39	-1.1	-6.5	4.6
Los Angeles	33.9	29.5	-4.4	-12.9	0.0130	0.0165	0.79	1.3	-1.9	4.6
Sacramento	45.2	37.1	-8.2	-18.0	0.0187	0.0269	0.69	1.9	-3.3	7.4
Tulare	78.8	63.7	-15.1	-19.2	0.0543	0.0595	0.91	5.6	-6.0	18.6
Non-pilot counties	45.3	35.5	-9.8	-21.6						

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). IID = Ignition Interlock Device. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013. Δ = Pre-post change. $\Delta\%$ = percentage change. ω = ARIMA adjusted estimate. SE_{ω} = Standard error of adjusted estimate. 95% $CI_{\Delta\%}$ = 95% confidence interval for the adjusted percentage change. The ARIMA structure parameters are not presented for sake of brevity. All ARIMA estimates are based on the natural log transformed series adjusted for the monthly conviction rate in the 54 non-pilot California counties, the U.S. average monthly retail price per gallon of gasoline, and the monthly California unemployment rate.

* $p < .05$, two-tailed from ARIMA model.

Question 2: What are the Rates of DUI Convictions among Second DUI Offenders?

ARIMA models were also used to examine whether the implementation of the IID pilot program was associated with a reduction in the number of repeat DUI violations in the pilot counties. Therefore, this analysis was focused on DUI offenders who had a conviction on their driver record that is considered as a prior for DUI and who are defined as second DUI offenders, which is described earlier. The unadjusted monthly license-based rates (per 100,000 licensed drivers) of DUI convictions among second DUI offenders before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—are illustrated in Figures 10–14. The vertical line in the figures indicates the implementation date of the IID pilot in the participating counties.

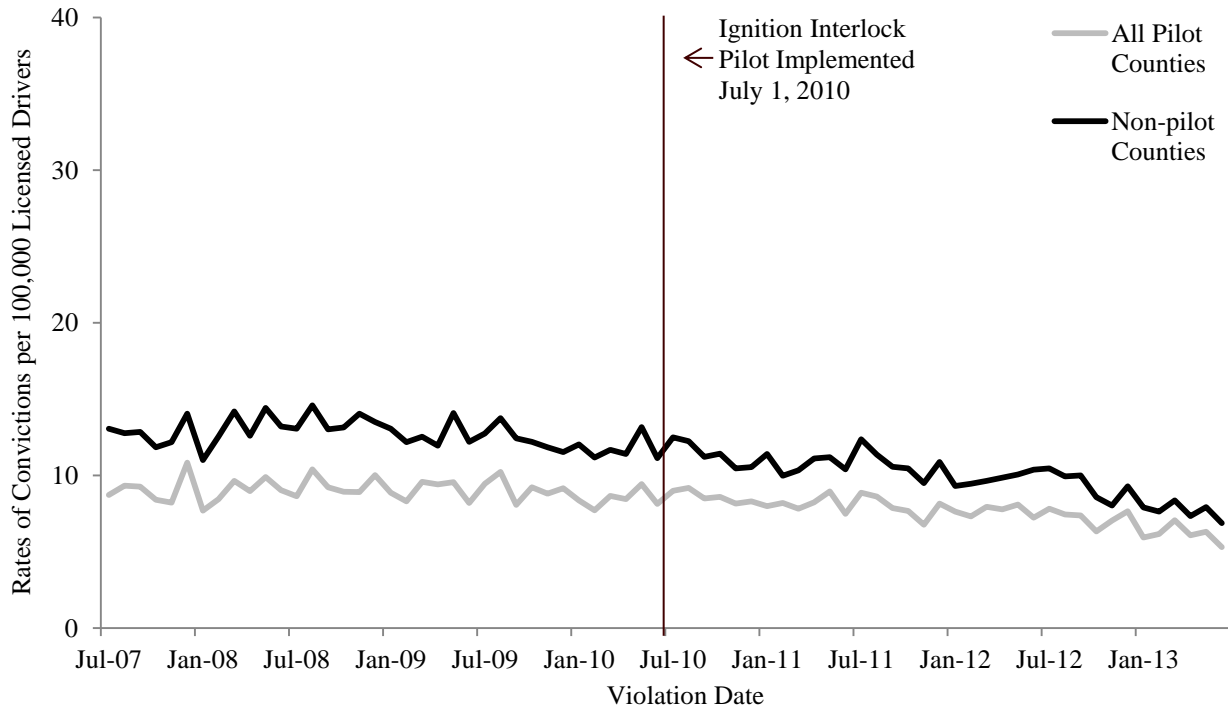


Figure 10. Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.

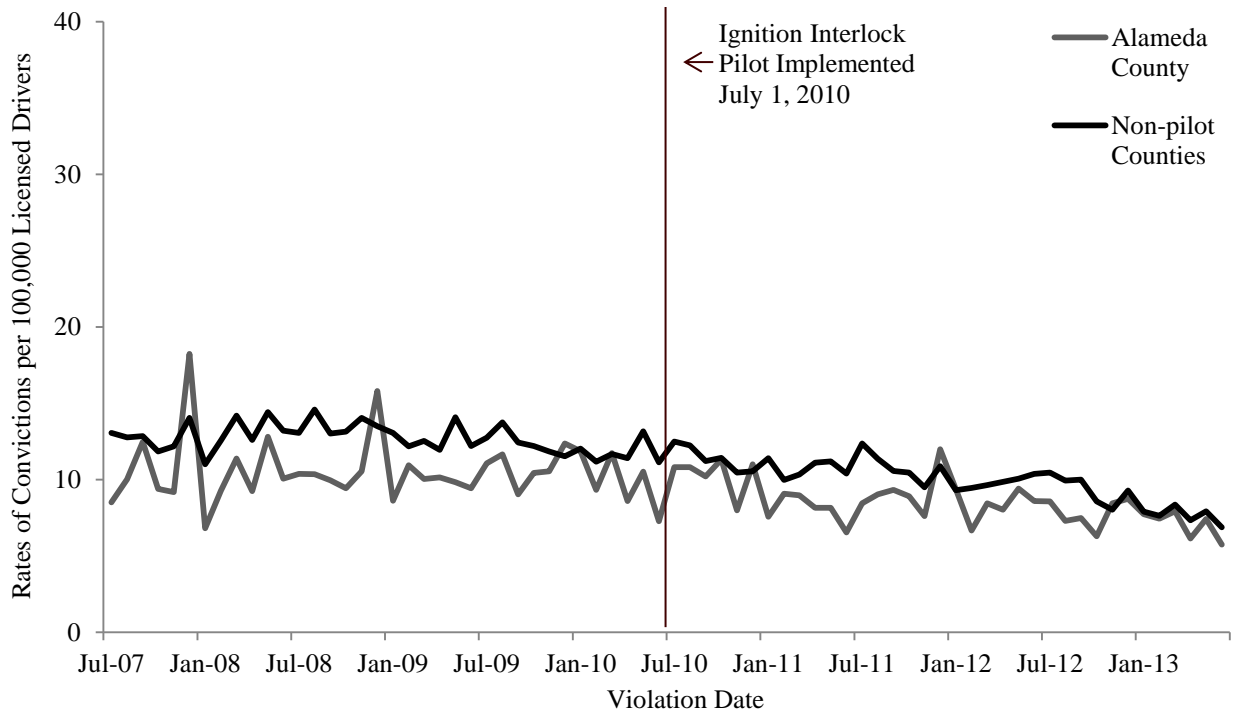


Figure 11. Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.

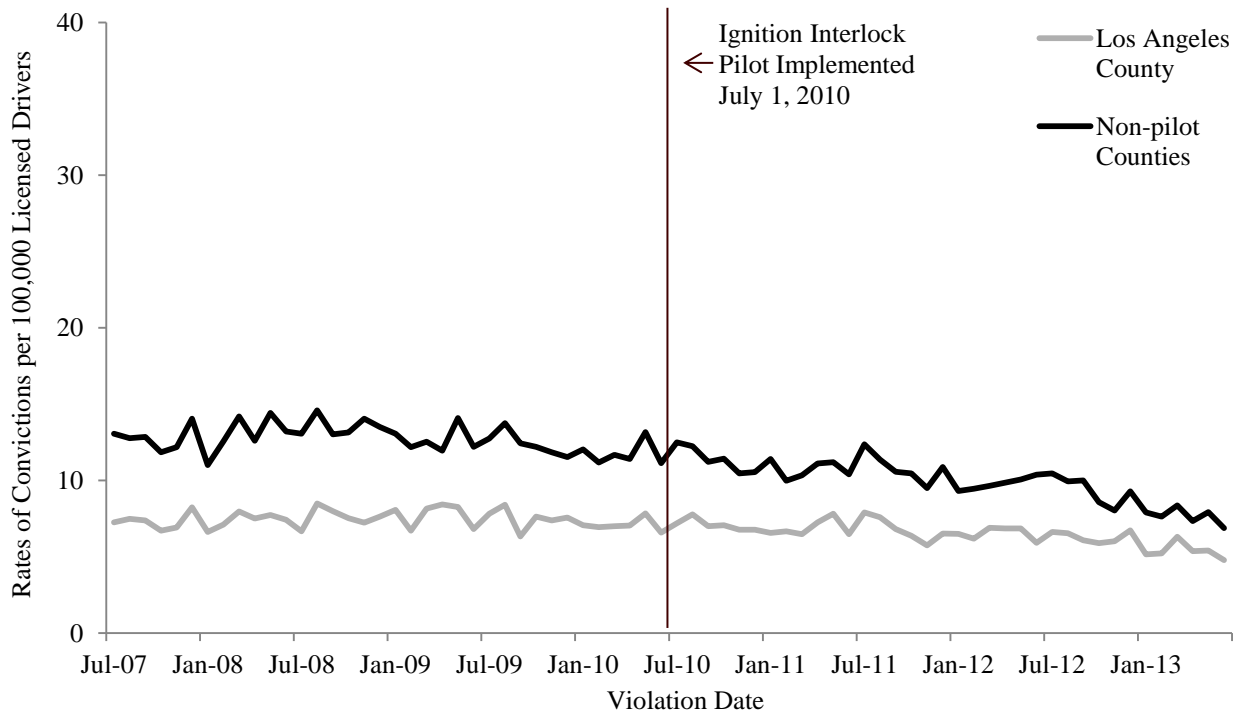


Figure 12. Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.

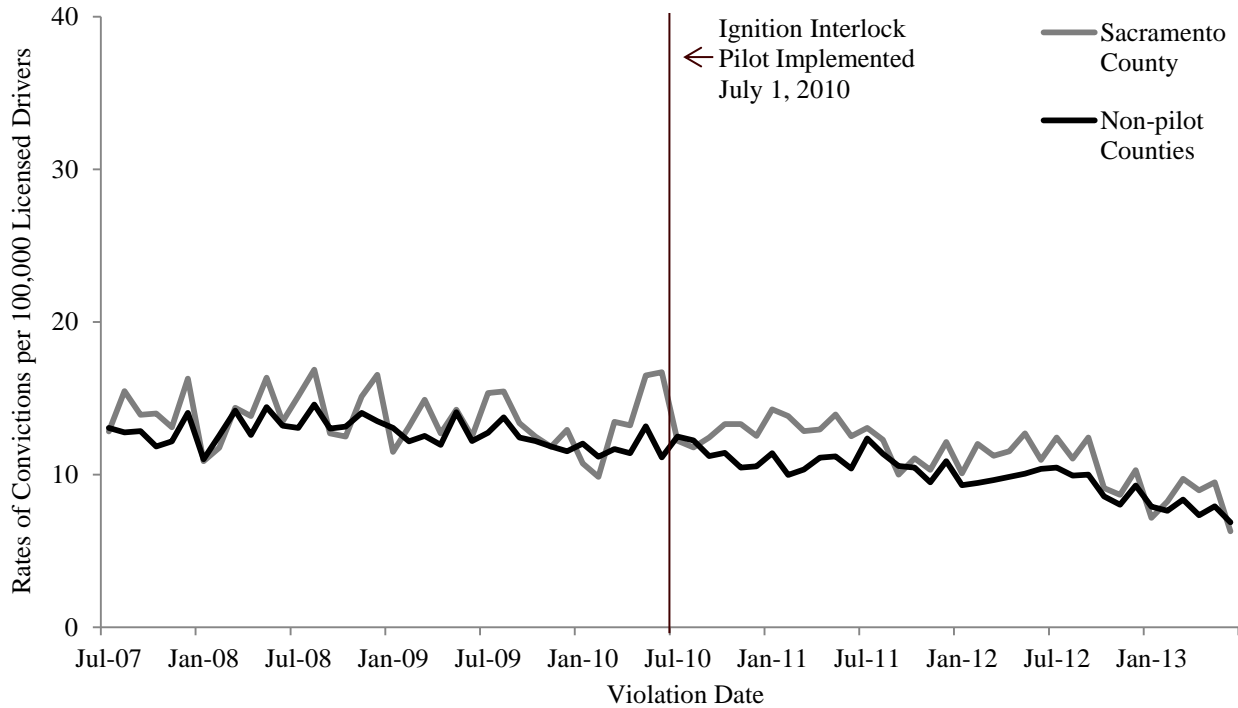


Figure 13. Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.

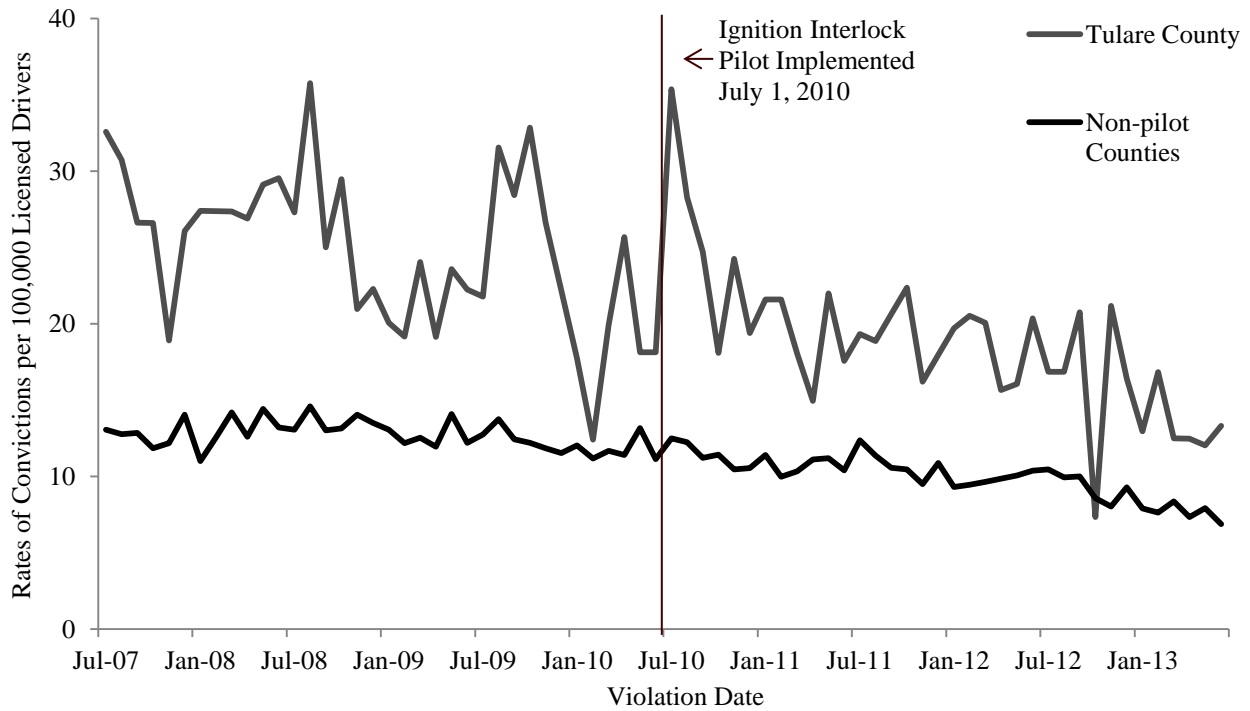


Figure 14. Unadjusted rates of DUI convictions among second DUI offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.

The unadjusted license-based rates of DUI convictions among second DUI offenders before and after the implementation of the IID pilot program in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—and the adjusted ARIMA results are shown in Table 4. Rates of DUI convictions among second DUI offenders per 100,000 licensed drivers decreased in all four pilot counties after the implementation of the IID pilot program, with a 15.2% decrease combined across all four pilot counties. However, rates of DUI convictions among second DUI offenders also decreased 21.5% across the combined non-pilot counties during the same time period. After adjusting for the change observed in the non-pilot counties and other covariates, the rates of DUI convictions among second DUI offenders in the pilot counties were found not to be different during the IID pilot program as compared to the pre-pilot period. This was again the case for each individual pilot county (Alameda: $\omega = 0.0673$, $t = 1.22$; Los Angeles: $\omega = 0.0143$, $t = 0.70$; Sacramento: $\omega = 0.0517$, $t = 1.30$; Tulare: $\omega = 0.0631$, $t = 0.85$), as well as for all four pilot counties combined ($\omega = 0.0152$, $t = 1.36$).

Table 4

Unadjusted Rates of DUI Convictions among Second DUI Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013

County	Unadjusted rate				Adjusted ARIMA results					
	Pre-pilot	Pilot	Δ	$\Delta\%$	ω	SE_{ω}	t	$\Delta\%$	95% $CI_{\Delta\%}$	
All pilot counties	9.0	7.6	-1.4	-15.2	0.0152	0.0112	1.36	1.5	-0.7	3.8
Alameda	10.5	8.5	-2.0	-19.0	0.0673	0.0550	1.22	7.0	-4.0	19.1
Los Angeles	7.4	6.5	-0.9	-12.6	0.0143	0.0204	0.70	1.4	-2.5	5.6
Sacramento	13.8	11.3	-2.5	-17.9	0.0517	0.0397	1.30	5.3	-2.6	13.8
Tulare	24.8	18.7	-6.1	-24.7	0.0631	0.0739	0.85	6.5	-7.8	23.1
Non-pilot counties	12.7	10.0	-2.7	-21.5						

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). IID = Ignition Interlock Device. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013. Δ = Pre-post change. $\Delta\%$ = percentage change. ω = ARIMA adjusted estimate. SE_{ω} = Standard error of adjusted estimate. 95% $CI_{\Delta\%}$ = 95% confidence interval for the adjusted percentage change. The ARIMA structure parameters are not presented for sake of brevity. All ARIMA estimates are based on the natural log transformed series adjusted for the monthly conviction rate in the 54 non-pilot California counties, the U.S. average monthly retail price per gallon of gasoline, and the monthly California unemployment rate.

* $p < .05$, two-tailed from ARIMA model.

Question 3: What are the Rates of DUI Convictions among Third-or-More DUI Offenders?

This analysis also examined whether the implementation of the IID pilot program was associated with a reduction in the number of repeat DUI violations in the pilot counties and it was concentrated on third-or-more DUI offenders in this case. Third-or-more DUI offenders are those who had two or more convictions on their driver record that are considered prior for DUI, as described earlier. The unadjusted monthly license-based rates (per 100,000 licensed drivers) of DUI convictions among third-or-more DUI offenders before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—are illustrated in Figures 15–19. The vertical line in the figures indicates the implementation date of the IID pilot in the participating counties.

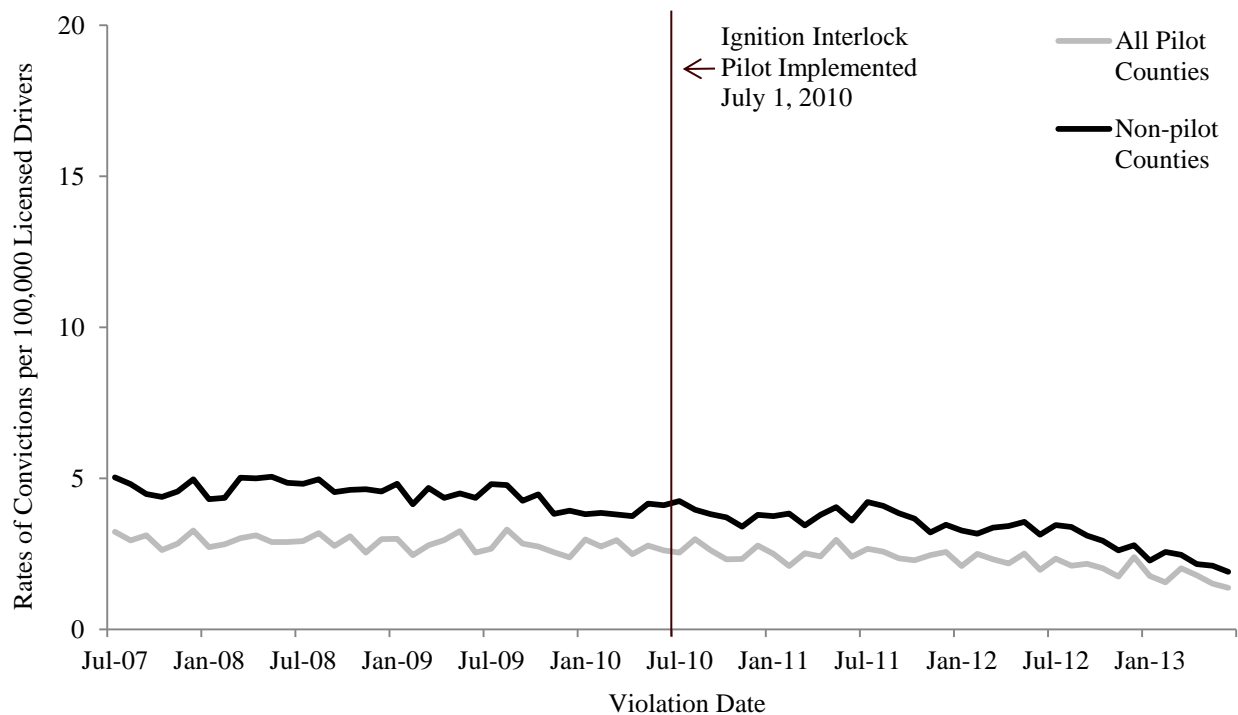


Figure 15. Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.

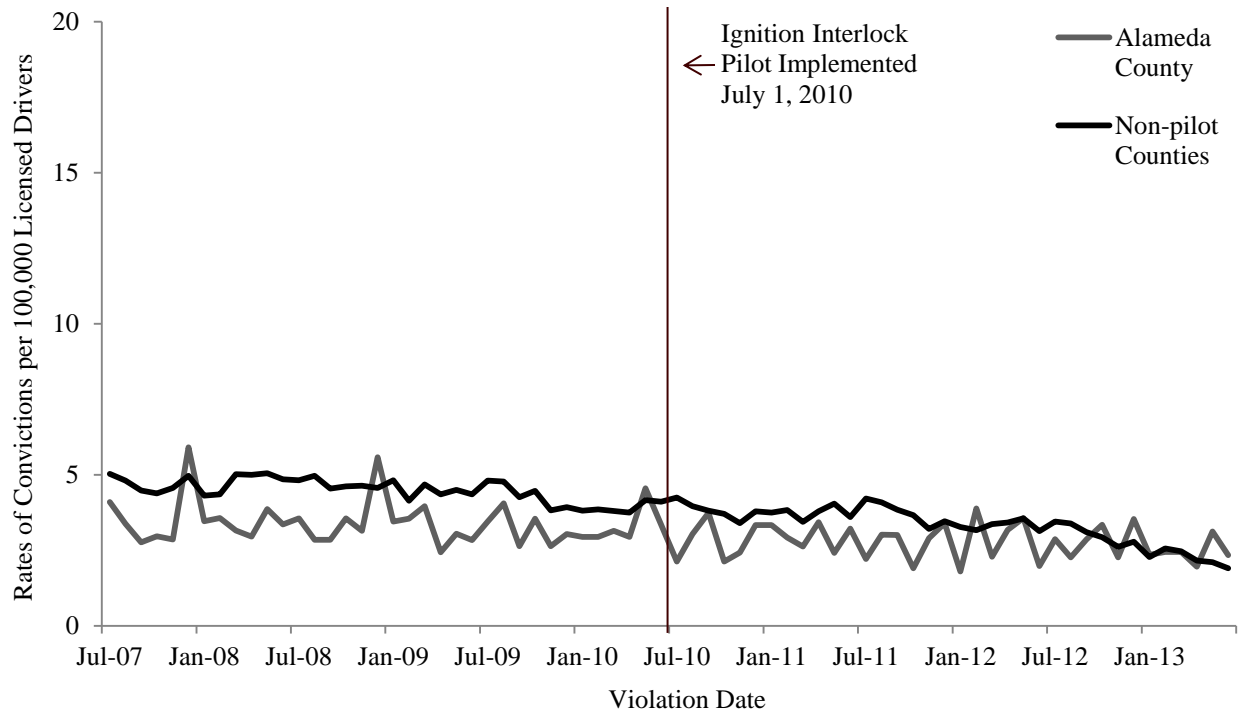


Figure 16. Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.

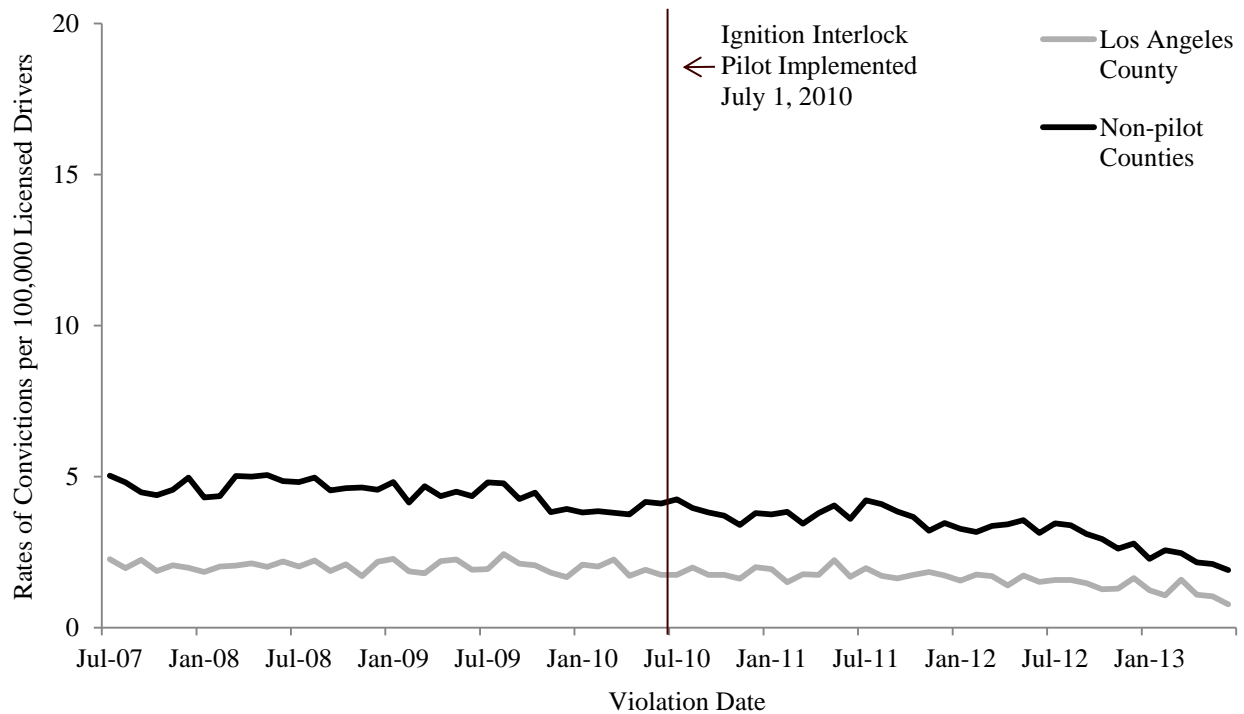


Figure 17. Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.

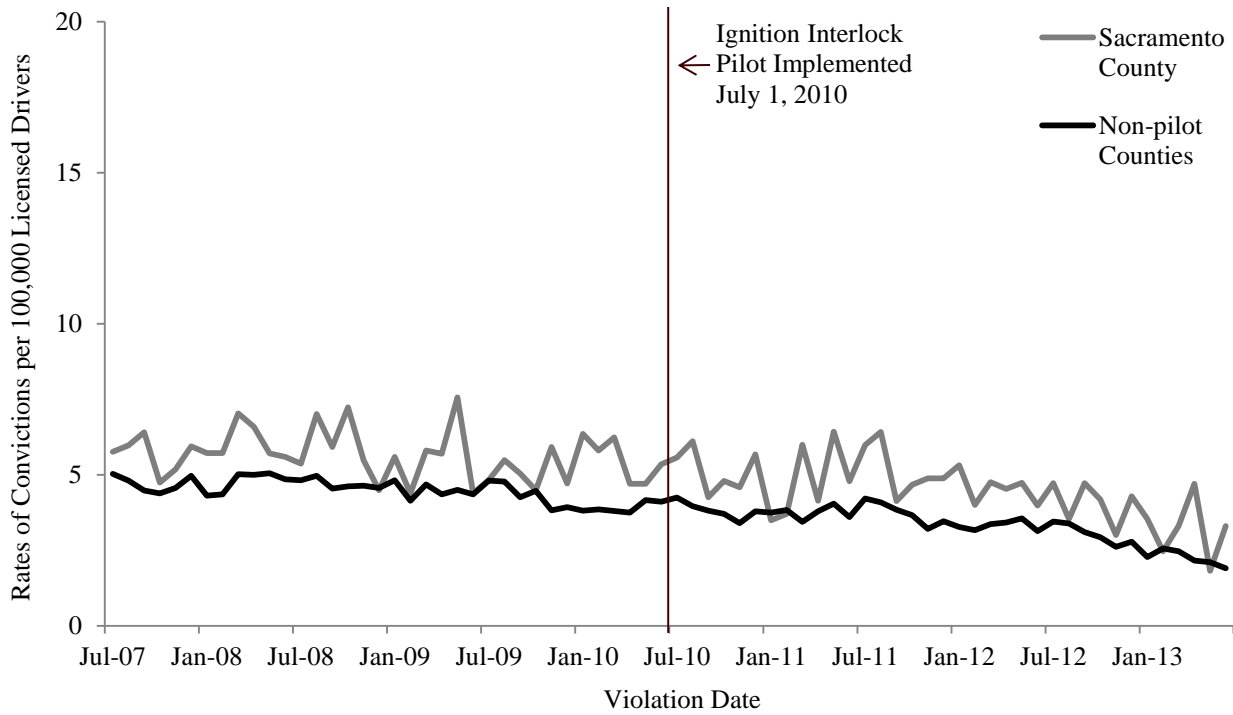


Figure 18. Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.

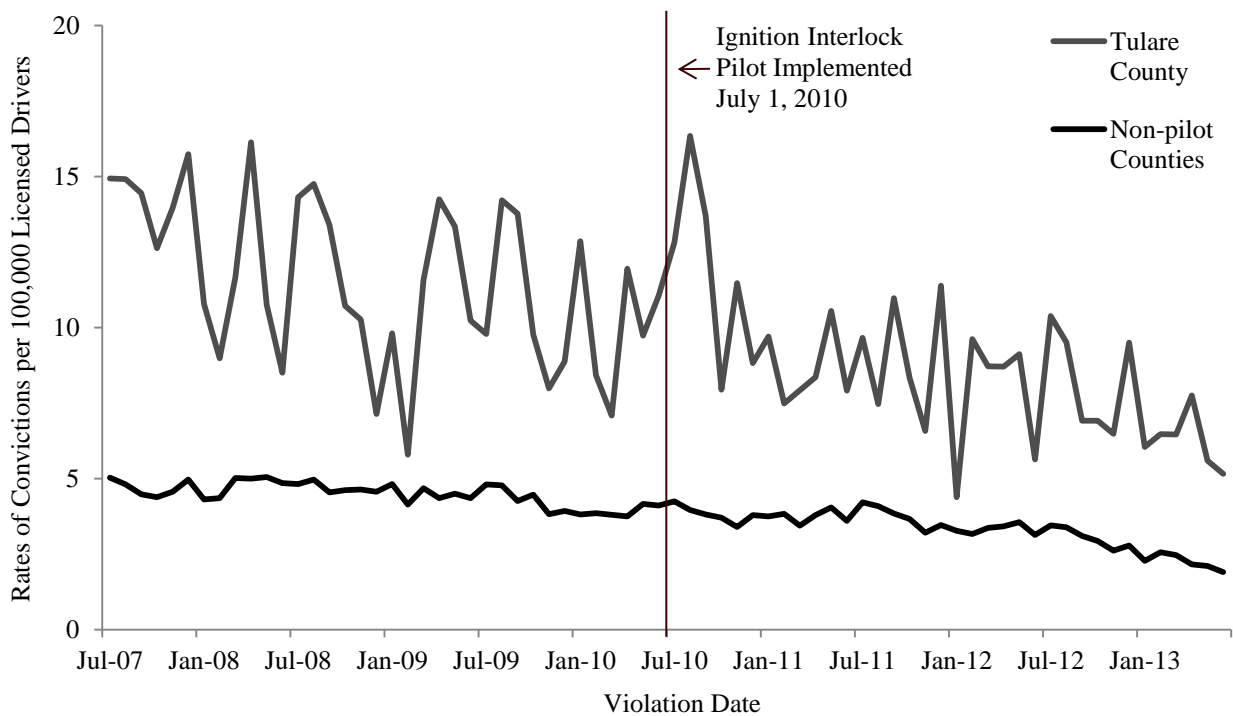


Figure 19. Unadjusted rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.

The unadjusted license-based rates of DUI convictions among third-or-more DUI offenders before and after the implementation of the IID pilot program in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—and the adjusted ARIMA results are shown in Table 5. Rates of DUI convictions among third-or-more DUI offenders per 100,000 licensed drivers decreased in all four pilot counties after the implementation of the IID pilot program, with a 20.7% decrease combined across all four pilot counties. That said, license-based rates of DUI convictions among third-or-more DUI offenders decreased even more (25.9%) across the combined non-pilot counties during the same time period. After adjusting for the change observed in the non-pilot counties and other covariates, third-or-more DUI offender license-based rates of DUI convictions in the pilot counties were found not to be different during the pilot program as compared to the pre-pilot period. This was the case for each individual pilot county (Alameda: $\omega = -0.0409$, $t = -1.34$; Los Angeles: $\omega = -0.0181$, $t = -0.43$; Sacramento: $\omega = -0.0667$, $t = -1.01$; Tulare: $\omega = -0.0721$, $t = -1.12$), as well as for all four pilot counties combined ($\omega = -0.0266$, $t = -1.14$).

Table 5

Unadjusted Rates of DUI Convictions among Third-or-More DUI Offenders per 100,000
Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013

County	Unadjusted rate				Adjusted ARIMA results					
	Pre-pilot	Pilot	Δ	$\Delta\%$	ω	SE_{ω}	t	$\Delta\%$	95% $CI_{\Delta\%}$	
All pilot counties	2.9	2.3	-0.6	-20.7	-0.0266	0.0233	-1.14	-2.6	-7.0	1.9
Alameda	3.4	2.8	-0.6	-18.6	-0.0409	0.0306	-1.34	-4.0	-9.6	1.9
Los Angeles	2.0	1.6	-0.4	-20.9	-0.0181	0.0421	-0.43	-1.8	-9.6	6.7
Sacramento	5.6	4.5	-1.2	-20.5	-0.0667	0.0662	-1.01	-6.5	-17.8	6.5
Tulare	11.5	8.6	-2.9	-25.0	-0.0721	0.0641	-1.12	-7.0	-17.9	5.5
Non-pilot counties	4.5	3.3	-1.2	-25.9						

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). IID = Ignition Interlock Device. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013. Δ = Pre-post change. $\Delta\%$ = percentage change. ω = ARIMA adjusted estimate. SE_{ω} = Standard error of adjusted estimate. 95% $CI_{\Delta\%}$ = 95% confidence interval for the adjusted percentage change. The ARIMA structure parameters are not presented for sake of brevity. All ARIMA estimates are based on the natural log transformed series adjusted for the monthly conviction rate in the 54 non-pilot California counties, the U.S. average monthly retail price per gallon of gasoline, and the monthly California unemployment rate.

* $p < .05$, two-tailed from ARIMA model.

Question 4: What are the Rates of DUI Convictions Combined with Alcohol- or Drug-Reckless Convictions among First Offenders?

First-time alcohol- or drug-reckless convictions were combined with first-time DUI convictions for this analysis to determine if the implementation of the IID pilot program impacted the rates of combined first DUI/alcohol- or drug-reckless convictions in the pilot counties. The central point and rationale for the combined analysis of alcohol/drug reckless convictions and DUI convictions is that persons who drive under the influence of alcohol or drugs, when arrested for DUI and prosecuted, are probably not aware that they may eventually be offered to plea down to an alcohol- or drug-reckless conviction rather than a DUI conviction. Therefore, analyzing the rates of DUI/alcohol- or drug-reckless convictions (combined) should provide a more extensive picture of whether the IID pilot program has had a general deterrent effect on drinking and driving behavior.

The unadjusted monthly license-based rates (per 100,000 licensed drivers) of first-time either DUI or alcohol- or drug-reckless convictions before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—are illustrated in Figures 20–24. The vertical line in the figures indicates the implementation date of the IID pilot in the participating counties.

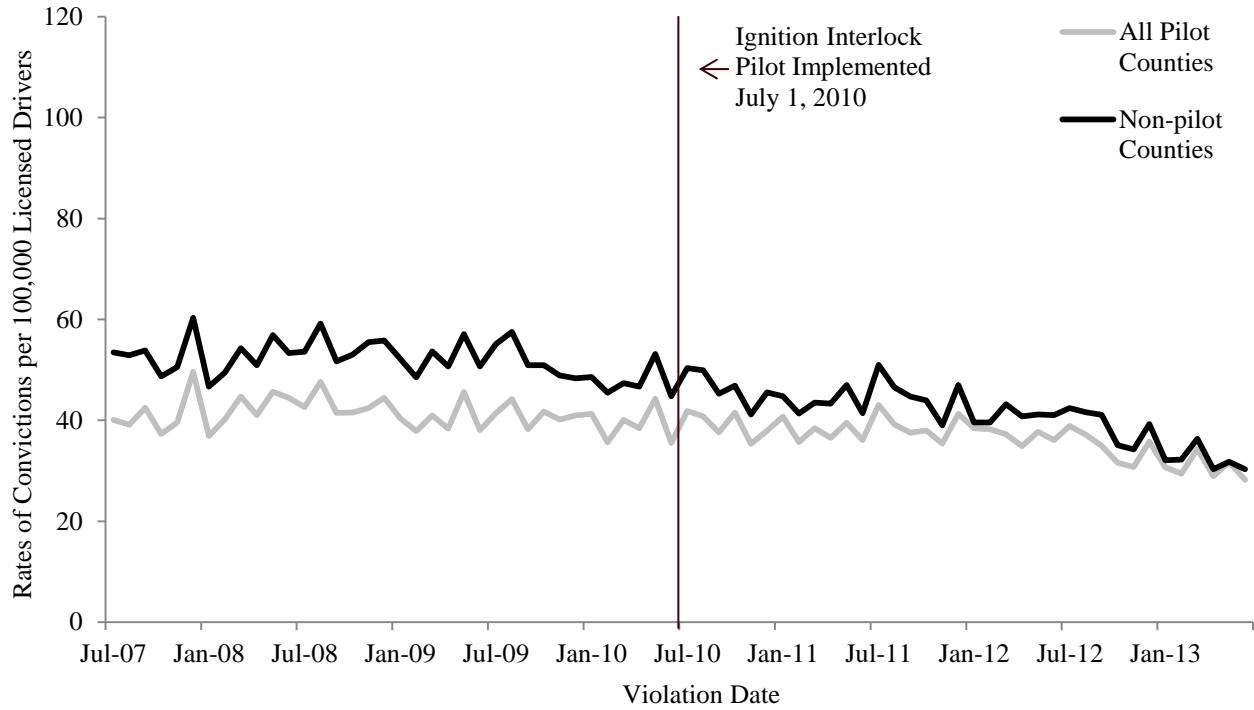


Figure 20. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.

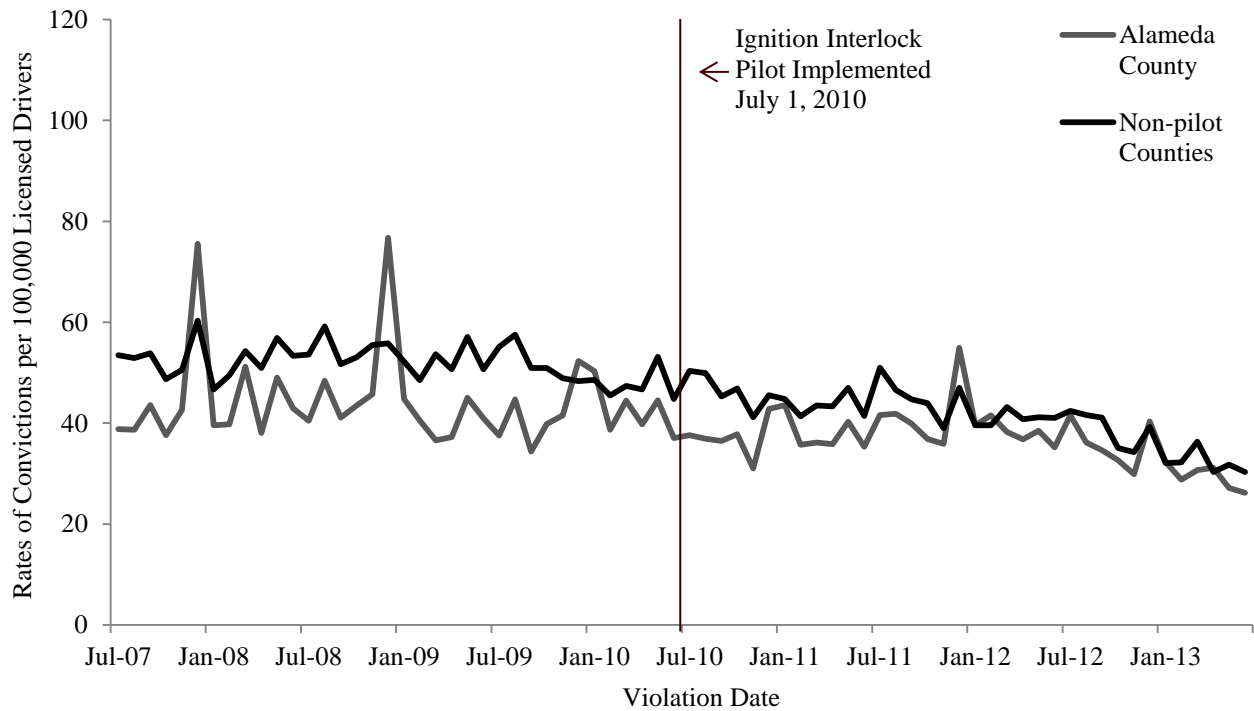


Figure 21. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.

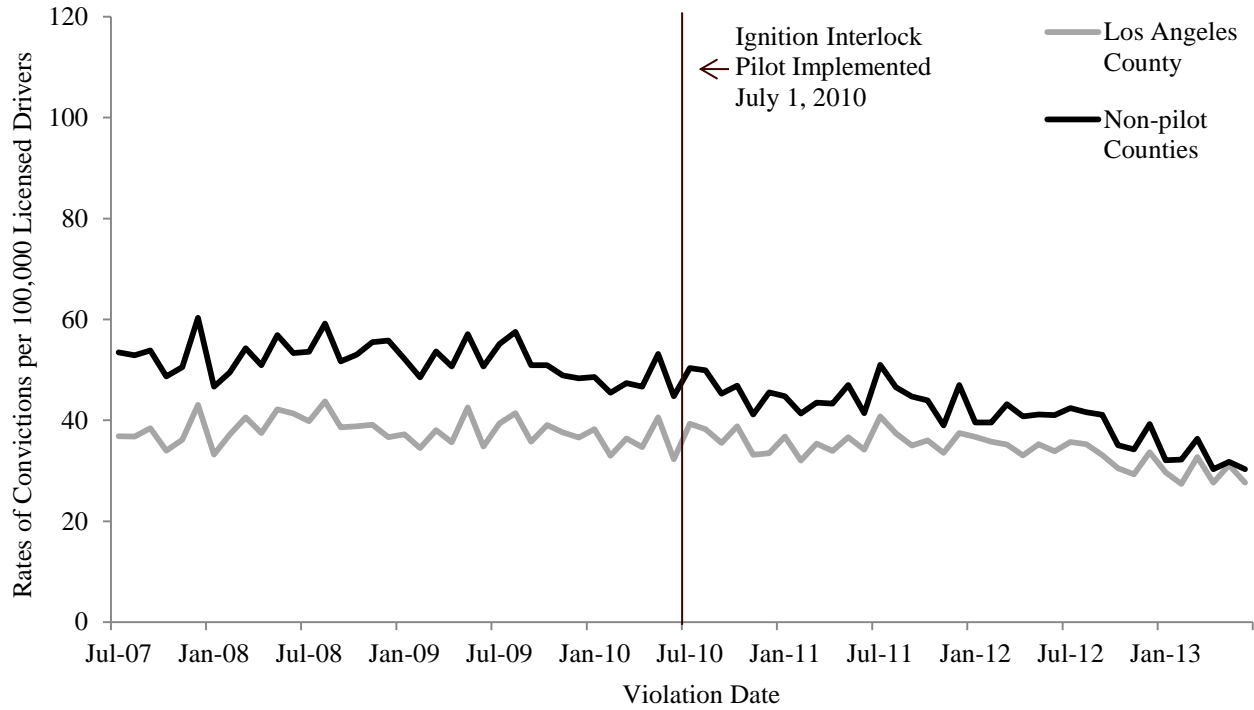


Figure 22. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.

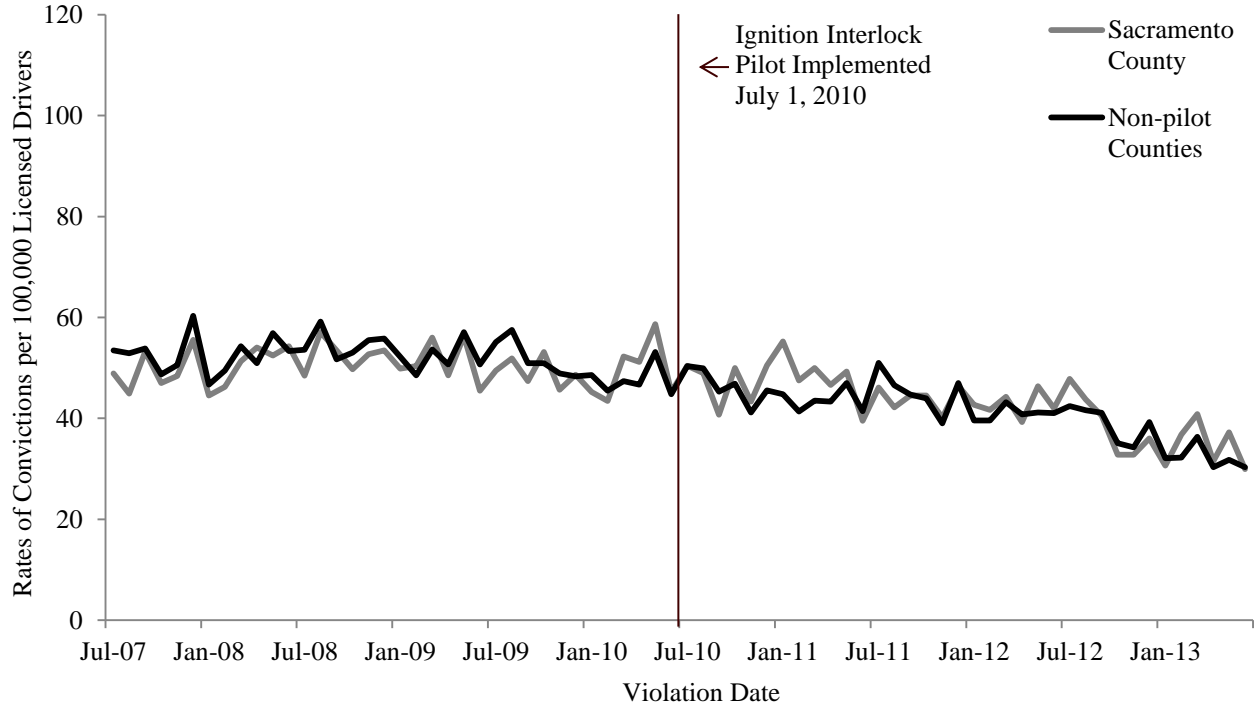


Figure 23. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.

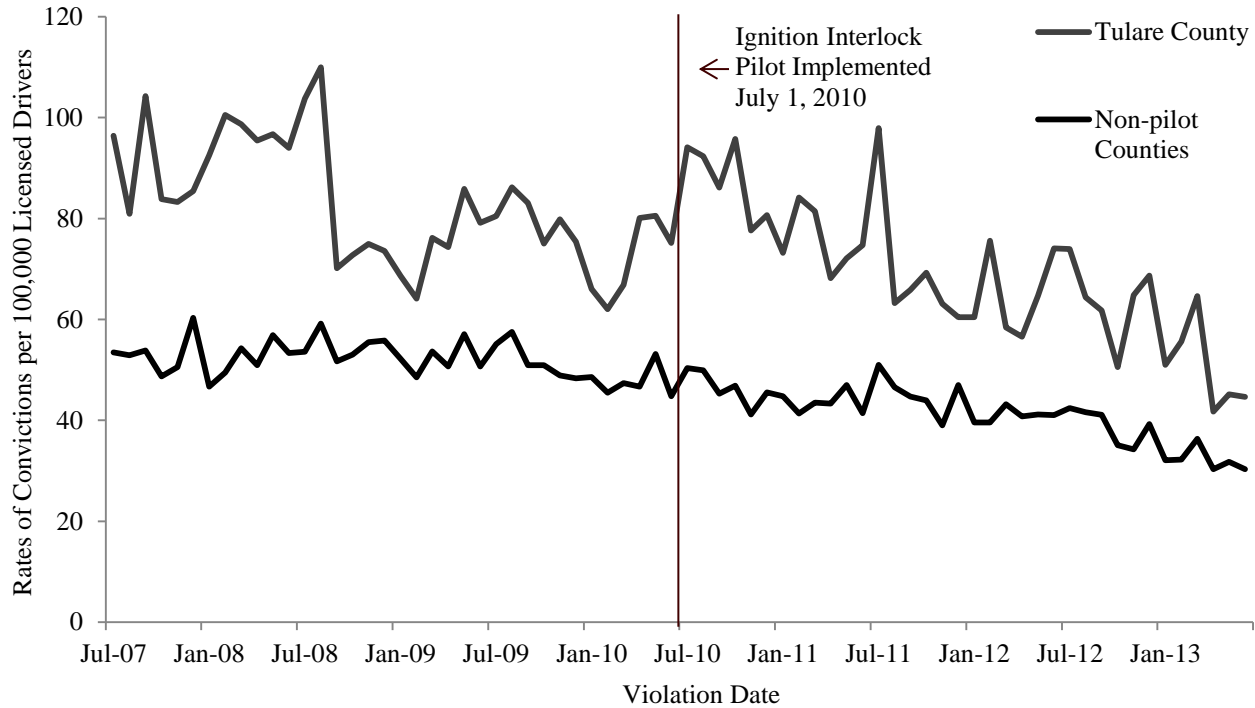


Figure 24. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among first offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.

The unadjusted rates of first-time either DUI/alcohol- or drug-reckless convictions before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—and the adjusted ARIMA results are shown in Table 6. The license-based rates of combined first-time DUI/alcohol- or drug-reckless convictions decreased in all four pilot counties after the implementation of the IID pilot program, with an 11.6% decrease combined across all four pilot counties. However, the rates of combined first DUI/alcohol- or drug-reckless conviction decreased much more (20.6%) across the combined non-pilot counties during the same time period. After adjusting for the change observed in the non-pilot counties and other covariates, the license-based rates of combined first DUI/alcohol- or drug-reckless convictions in the pilot counties were found not to be different during the pilot program as compared to the pre-pilot period. This was the case for each individual pilot county (Alameda: $\omega = -0.0226$, $t = -0.85$; Los Angeles: $\omega = 0.0245$, $t = 1.57$; Sacramento: $\omega = 0.0357$, $t = 1.18$; Tulare: $\omega = 0.0367$, $t = 0.93$), as well as for all four pilot counties combined ($\omega = 0.0134$, $t = 0.90$).

Table 6

Unadjusted Rates of DUI/Alcohol- or Drug-Reckless Convictions (Combined) among First Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013

County	Unadjusted rate				Adjusted ARIMA results					
	Pre-pilot	Pilot	Δ	$\Delta\%$	ω	SE_{ω}	t	$\Delta\%$	95% $CI_{\Delta\%}$	
All pilot counties	41.2	36.4	-4.8	-11.6	0.0134	0.0148	0.90	1.3	-1.5	4.3
Alameda	44.0	36.7	-7.3	-16.5	-0.0226	0.0267	-0.85	-2.2	-7.2	3.0
Los Angeles	37.8	34.2	-3.6	-9.6	0.0245	0.0156	1.57	2.5	-0.6	5.7
Sacramento	50.4	42.6	-7.8	-15.5	0.0357	0.0302	1.18	3.6	-2.3	10.0
Tulare	82.7	68.8	-13.9	-16.8	0.0367	0.0394	0.93	3.7	-4.0	12.1
Non-pilot counties	52.0	41.3	-10.7	-20.6						

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). Alcohol- or drug-reckless = Plea down from DUI (California Vehicle Code 23103). IID = Ignition Interlock Device. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013. Δ = Pre-post change. $\Delta\%$ = percentage change. ω = ARIMA adjusted estimate. SE_{ω} = Standard error of adjusted estimate. 95% $CI_{\Delta\%}$ = 95% confidence interval for the adjusted percentage change. The ARIMA structure parameters are not presented for sake of brevity. All ARIMA estimates are based on the natural log transformed series adjusted for the monthly conviction rate in the 54 non-pilot California counties, the U.S. average monthly retail price per gallon of gasoline, and the monthly California unemployment rate.

* $p < .05$, two-tailed from ARIMA model.

Question 5: What are the Rates of DUI Convictions Combined with Alcohol- or Drug-Reckless Convictions among Second Offenders?

This analysis examined the appearance of either DUI or alcohol- or drug-reckless convictions among second offenders or those who already had one conviction on their driver record that is considered as prior for DUI. Alcohol- or drug-reckless convictions were included in this analysis for the same reason mentioned above in the previous analysis results. That is, the intent was to determine if the implementation of the IID pilot program impacted the license-based rates of combined first DUI/alcohol- or drug-reckless convictions in the pilot counties among repeat offenders or second offenders in this case.

The unadjusted monthly license-based rates (per 100,000 licensed drivers) of second-time either DUI/alcohol- or drug-reckless convictions (combined) before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—are illustrated in Figures 25–29. The vertical line in the figures indicates the implementation date of the IID pilot in the participating counties.

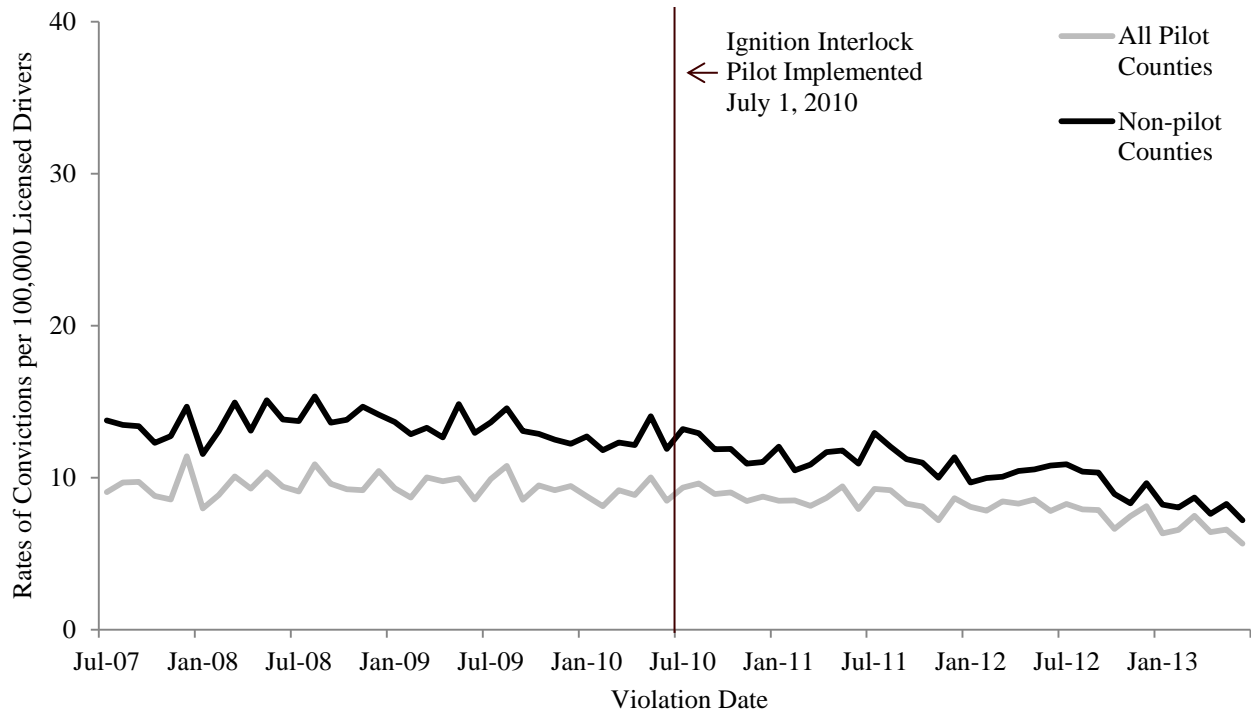


Figure 25. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.

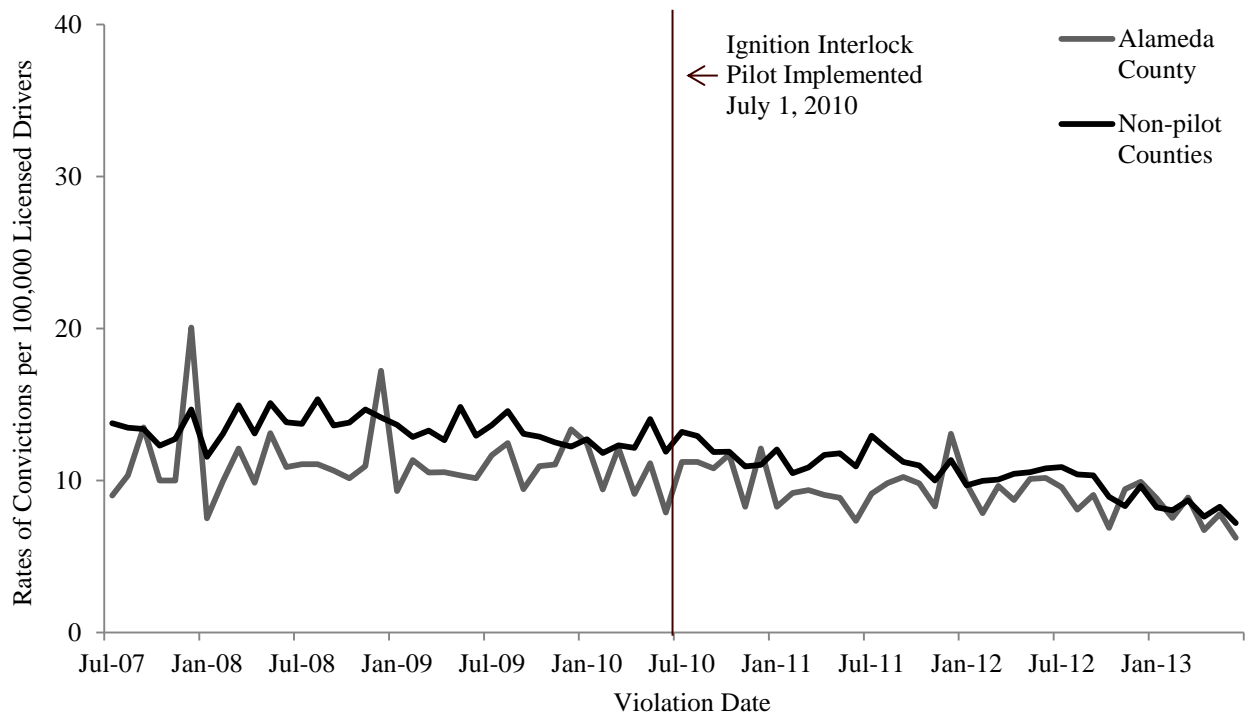


Figure 26. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.

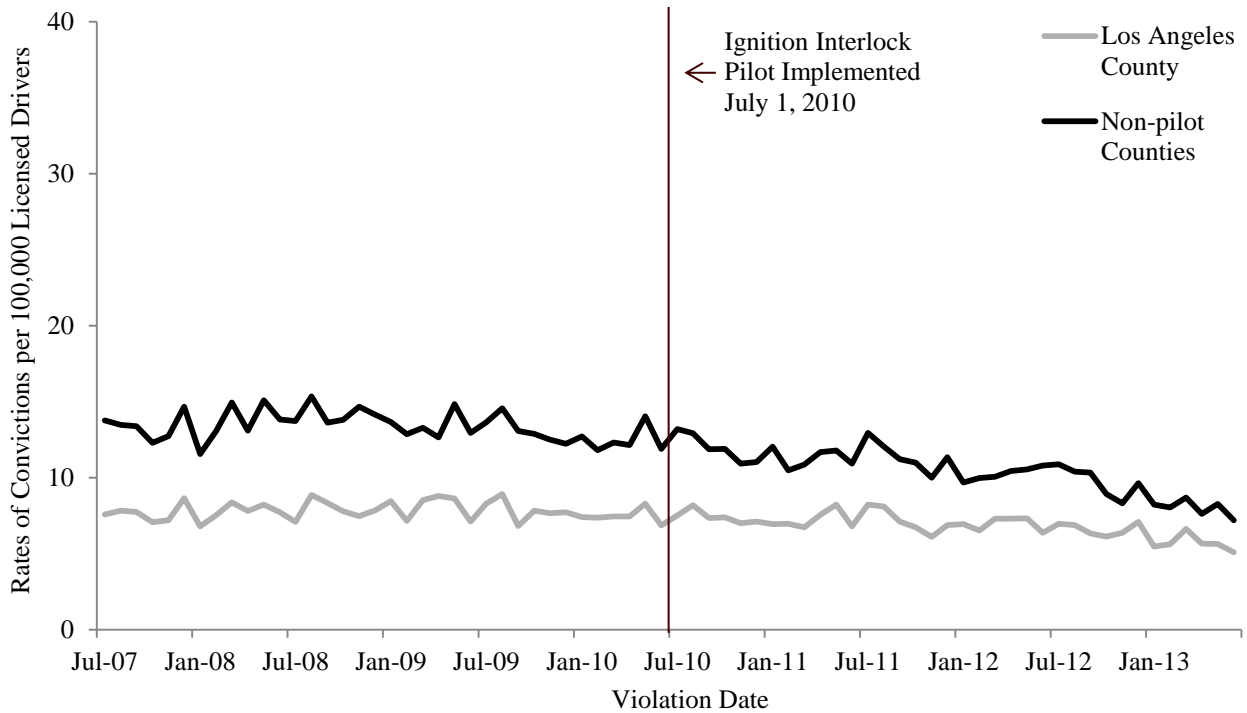


Figure 27. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.

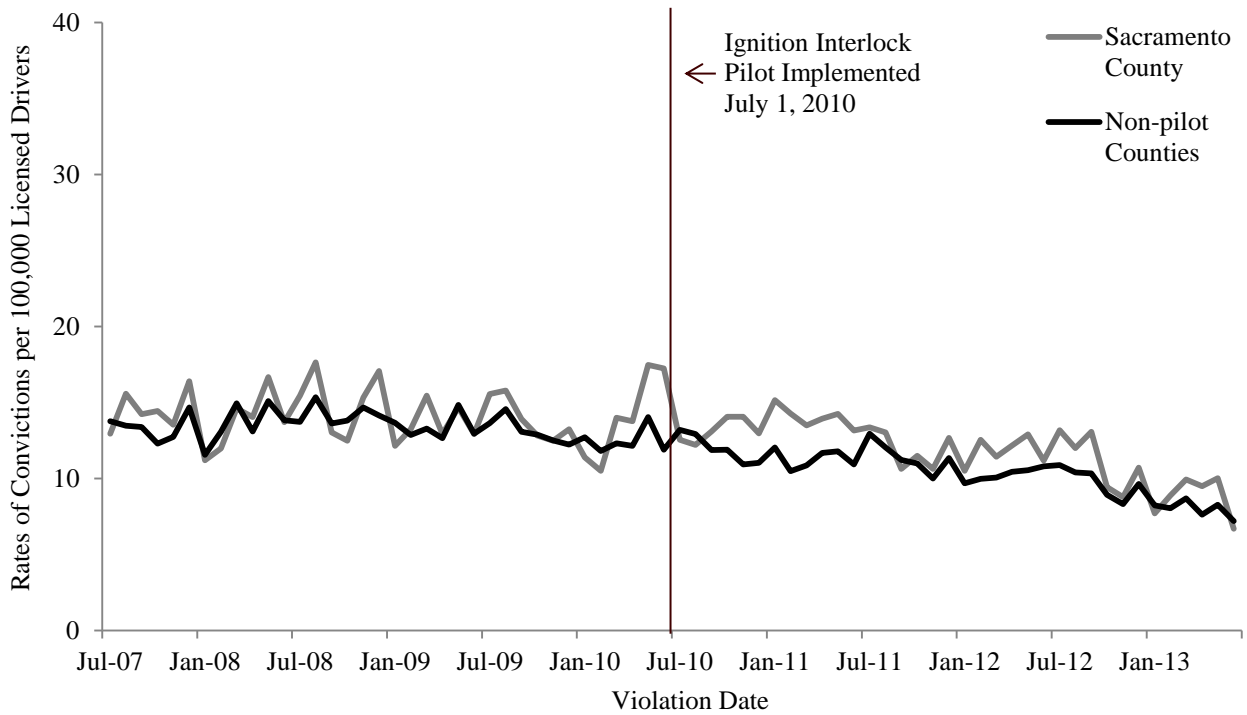


Figure 28. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.

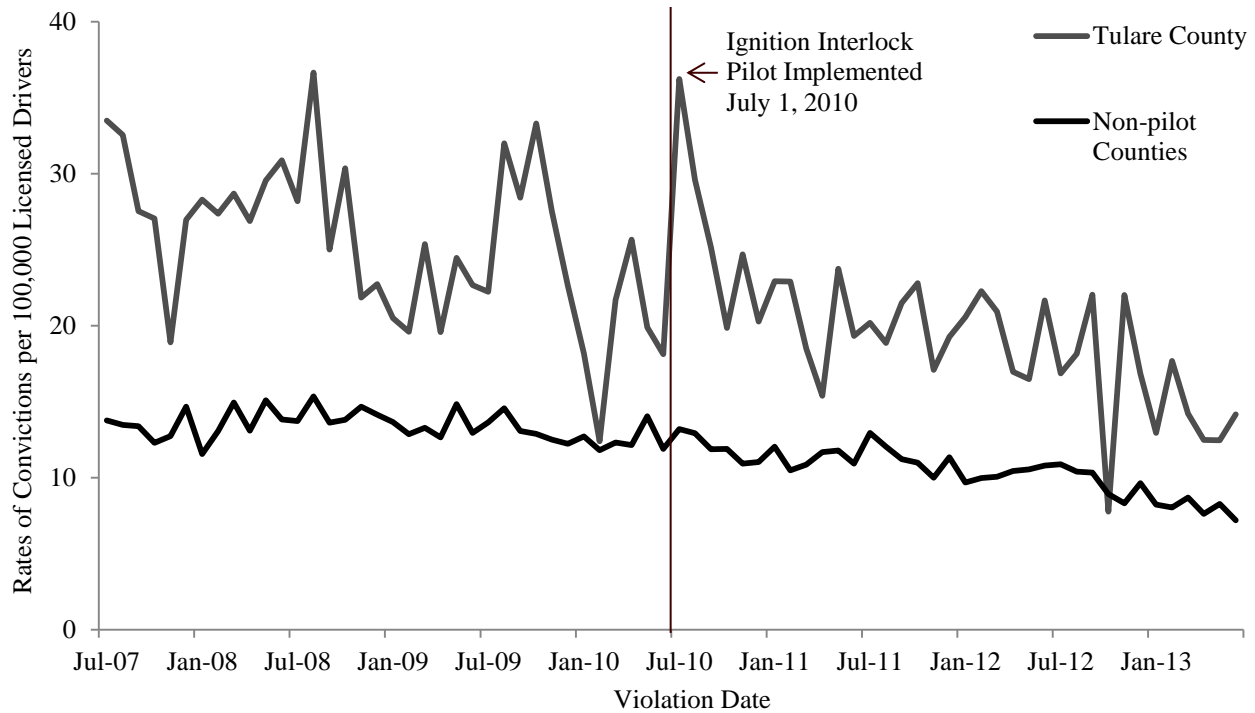


Figure 29. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.

The unadjusted license-based rates of DUI/alcohol- or drug-reckless convictions (combined) among second offenders before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—and the adjusted ARIMA results are shown in Table 7. The combined rates of DUI/alcohol- or drug-reckless convictions among second offenders decreased in all four pilot counties after the implementation of the IID pilot program, with a 14.2% decrease combined across all four pilot counties. Again, however, the rate of combined DUI/alcohol- or drug-reckless conviction among second offenders decreased more (21.8%) across the combined non-pilot counties during the same time period. After adjusting for the change observed in the non-pilot counties and other covariates, the rates of combined DUI/alcohol- or drug-reckless conviction among second offenders in the individual pilot counties were found not to be different during the IID pilot program as compared to the pre-pilot period (Alameda: $\omega = 0.0598$, $t = 1.05$; Los Angeles: $\omega = 0.0384$, $t = 1.70$; Sacramento: $\omega = 0.0636$, $t = 1.61$; Tulare: $\omega = 0.0943$, $t = 1.28$). However, combined across all four pilot counties, the rate of combined DUI/alcohol- or drug-reckless convictions among second offenders was found to be 3.7% higher after the pilot program than it was beforehand ($\omega = 0.0366$, $t = 2.12$). This seemingly contradictory finding may be a result of the fact that although the rates for the pilot counties decreased, they decreased less than the rates for the non-pilot counties, thus indicating overall net comparative increase in the combined rates

of DUI/alcohol- or drug- reckless convictions among second offenders in the pilot counties. Also, the analysis combining all pilot counties involves more statistical power (i.e., the ability to detect a difference between the groups if one truly does exist), and is therefore able to more reliably detect the net increase.

Table 7

Unadjusted Rates of DUI/Alcohol- or Drug-Reckless Convictions (Combined) among Second Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013

County	Unadjusted rate					Adjusted ARIMA results				
	Pre-pilot	Pilot	Δ	$\Delta\%$	ω	SE_{ω}	t	$\Delta\%$	95% $CI_{\Delta\%}$	
All pilot counties	9.4	8.1	-1.3	-14.2	0.0366	0.0172	2.12*	3.7	0.3	7.3
Alameda	11.1	9.3	-1.9	-16.9	0.0598	0.0568	1.05	6.2	-5.0	18.7
Los Angeles	7.8	6.9	-0.9	-12.1	0.0384	0.0226	1.70	3.9	-0.6	8.6
Sacramento	14.2	11.8	-2.3	-16.5	0.0636	0.0394	1.61	6.6	-1.4	15.1
Tulare	25.5	19.6	-5.9	-23.1	0.0943	0.0736	1.28	9.9	-4.9	26.9
Non-pilot counties	13.4	10.5	-2.9	-21.8						

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). Alcohol- or drug-reckless = Plea down from DUI (California Vehicle Code 23103). IID = Ignition Interlock Device. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013. Δ = Pre-post change. $\Delta\%$ = percentage change. ω = ARIMA adjusted estimate. SE_{ω} = Standard error of adjusted estimate. 95% $CI_{\Delta\%}$ = 95% confidence interval for the adjusted percentage change. The ARIMA structure parameters are not presented for sake of brevity. All ARIMA estimates are based on the natural log transformed series adjusted for the monthly conviction rate in the 54 non-pilot California counties, the U.S. average monthly retail price per gallon of gasoline, and the monthly California unemployment rate.

* $p < .05$, two-tailed from ARIMA model.

Question 6: What are the Rates of DUI Convictions Combined with Alcohol- or Drug-Reckless Convictions among Third-or-More Offenders?

For this analysis alcohol- or drug-reckless convictions were combined with DUI convictions among offenders who had two or more convictions on their driver record that are considered prior for DUI. Alcohol- or drug-reckless convictions were included in this analysis for the same reason mentioned above in the two previous analyses results. Specifically, it was desired to determine if the implementation of the IID pilot program impacted the license-based rates of combined DUI/alcohol- or drug-reckless convictions in the pilot counties among repeat offenders, which are third-or-more offenders in this case.

The unadjusted monthly license-based rates (per 100,000 licensed drivers) of third-or-more offenders of DUI/alcohol- or drug-reckless convictions (combined) before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—are illustrated in Figures 30–34. The vertical line in the figures indicates the implementation date of the IID pilot in the participating counties.

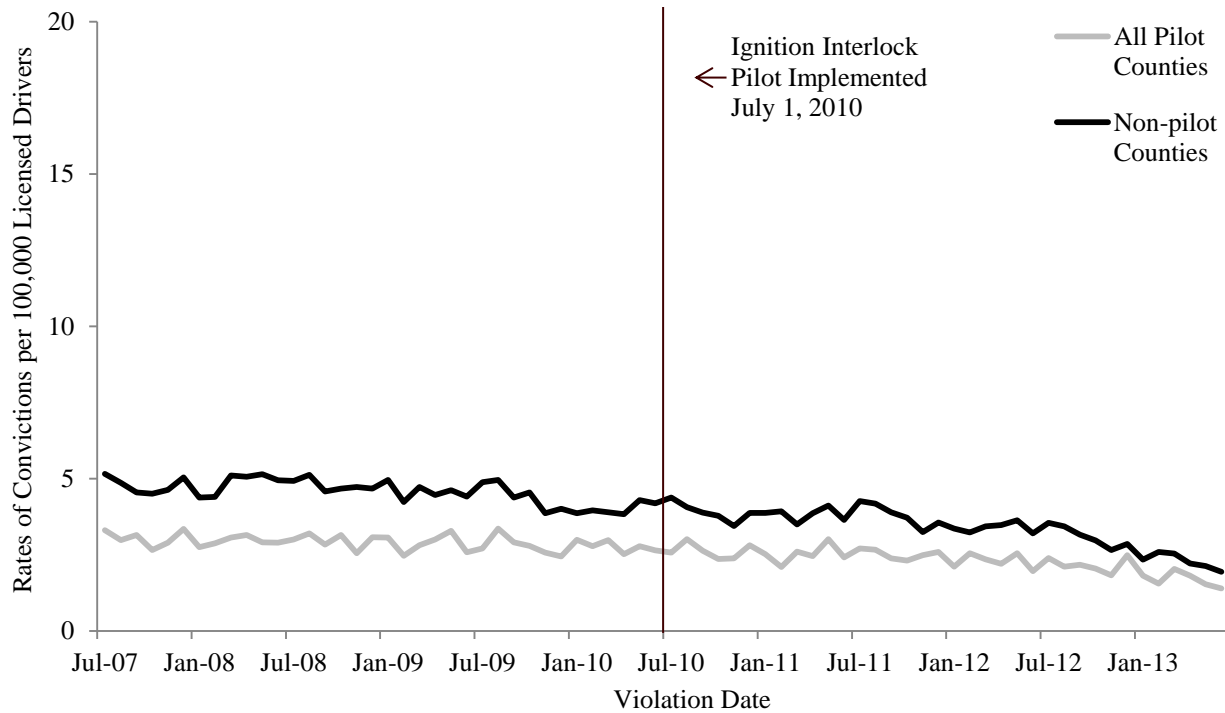


Figure 30. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in all IID pilot counties (combined), July 2007–June 2013.

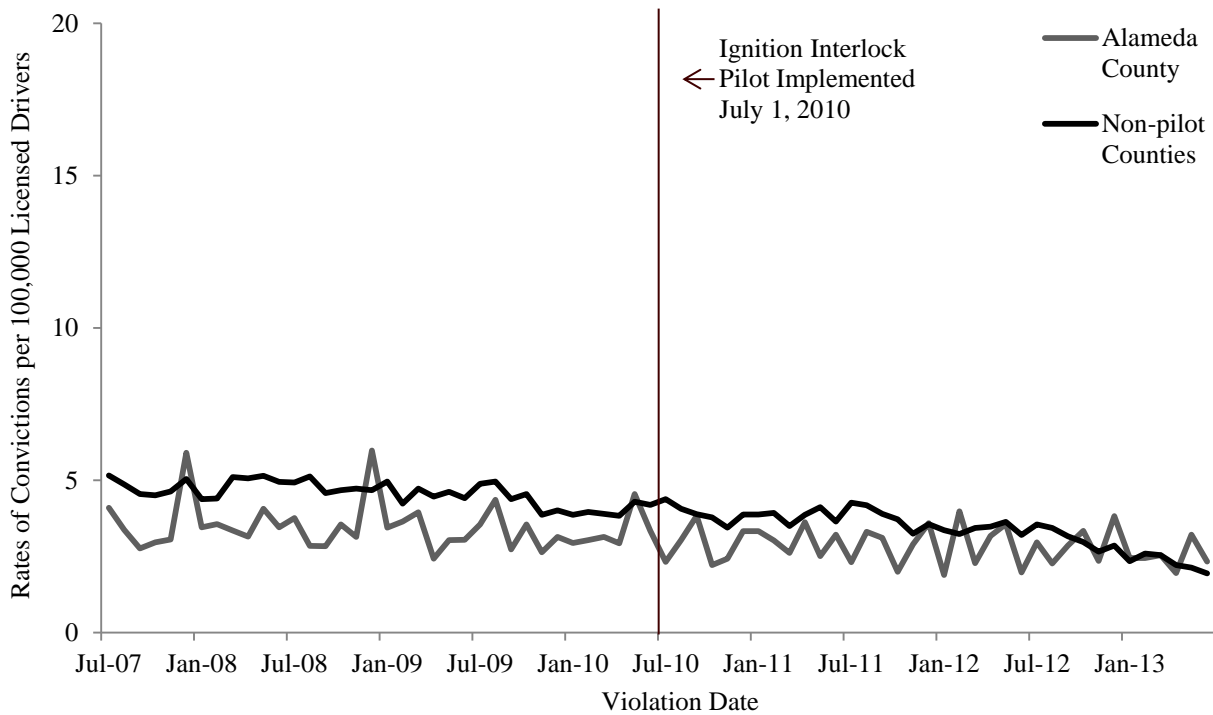


Figure 31. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Alameda County, July 2007–June 2013.

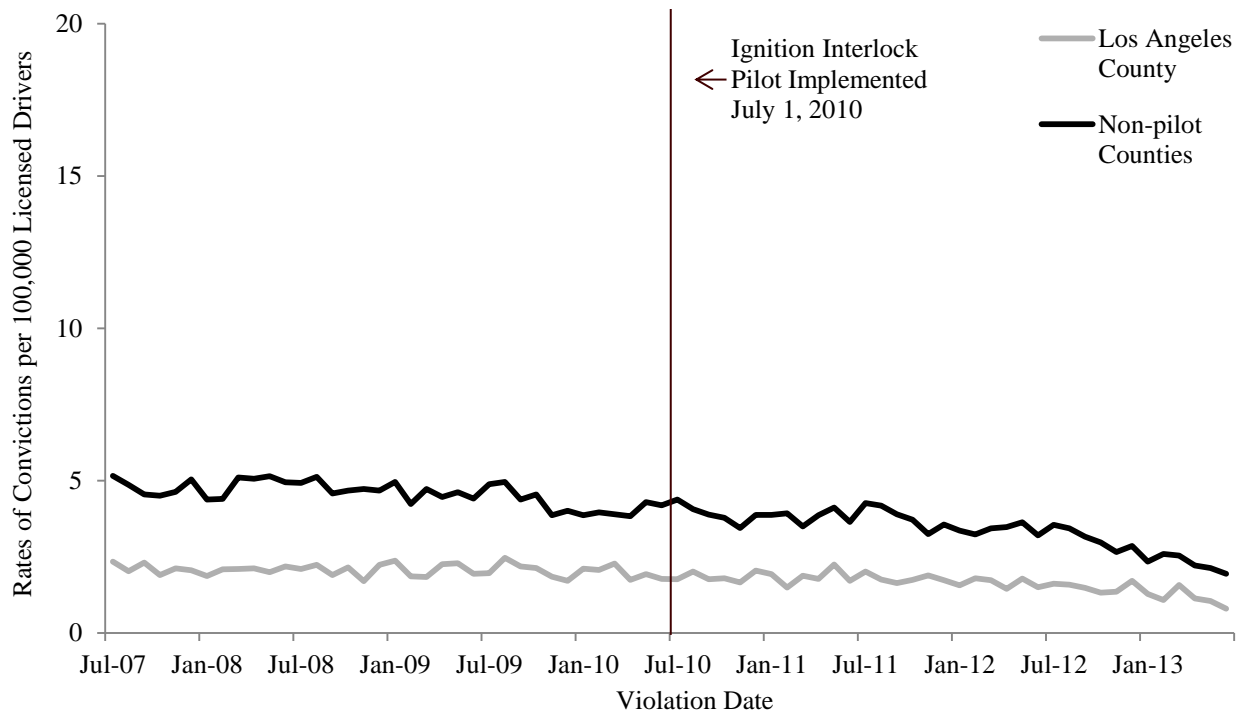


Figure 32. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Los Angeles County, July 2007–June 2013.

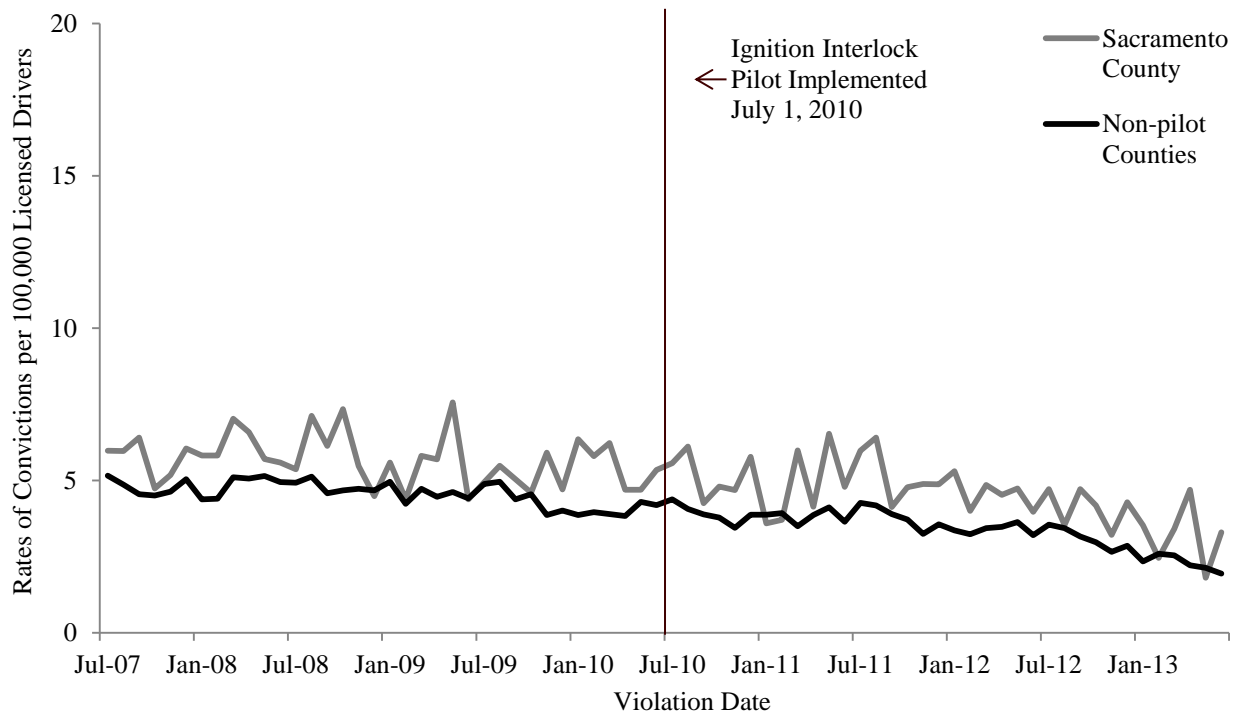


Figure 33. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Sacramento County, July 2007–June 2013.

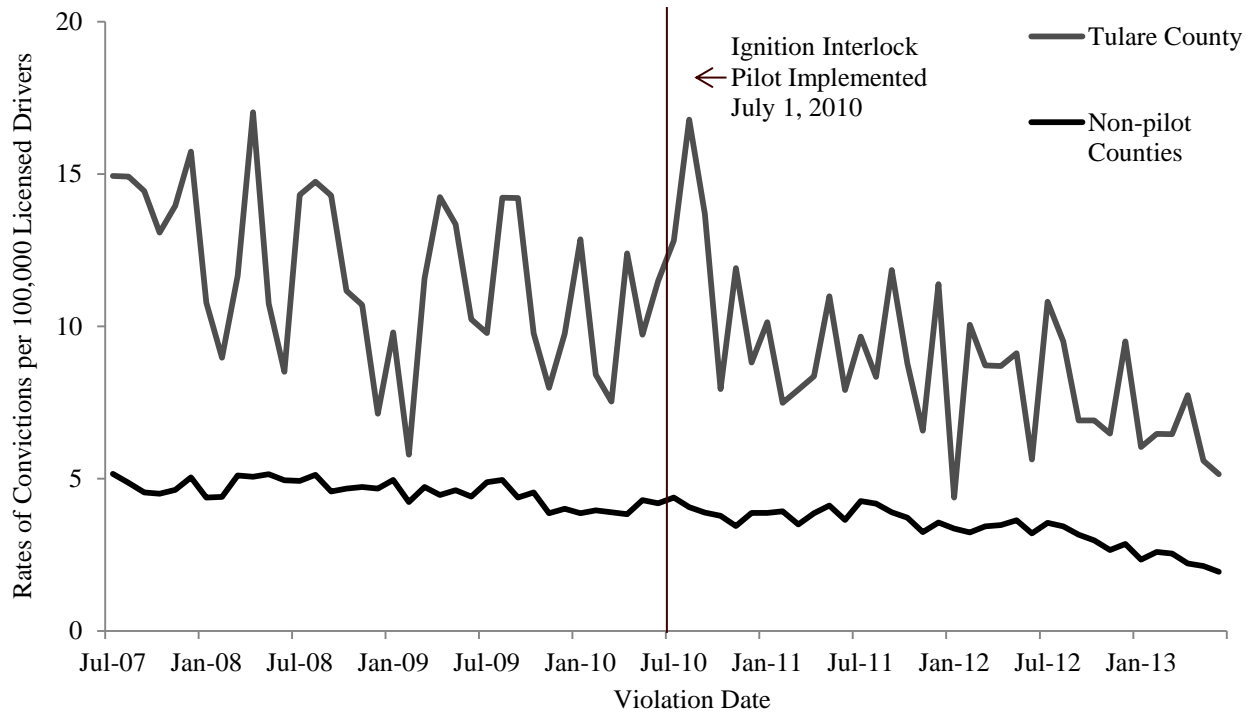


Figure 34. Unadjusted rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders per 100,000 licensed drivers in Tulare County, July 2007–June 2013.

The unadjusted license-based rates of DUI/alcohol- or drug-reckless convictions (combined) among third-or-more offenders before and after the IID pilot was implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties—as well as all four pilot counties combined—and the adjusted ARIMA results are shown in Table 8. The combined license-based rates of DUI/alcohol- or drug-reckless convictions among third-or-more offenders decreased in all four pilot counties after the implementation of the IID pilot program, with a 20.6% decrease combined across all four pilot counties. Again, the rates of combined DUI/alcohol- or drug-reckless convictions among third-or-more offenders decreased more (25.9%) across the combined non-pilot counties during the same time period. After adjusting for the change observed in the non-pilot counties and other covariates, the license-based rates of combined DUI/alcohol- or drug-reckless conviction among third-or-more offenders in the pilot counties were found not to be different during the pilot program as compared to the pre-pilot period. This was again the case for each individual pilot county (Alameda: $\omega = -0.0383$, $t = -1.31$; Los Angeles: $\omega = -0.0159$, $t = -0.38$; Sacramento: $\omega = -0.0657$, $t = -1.00$; Tulare: $\omega = 0.0749$, $t = 1.01$), as well as all four pilot counties combined ($\omega = -0.0232$, $t = -1.02$).

Table 8

Unadjusted Rates of DUI/Alcohol- or Drug-Reckless Convictions (Combined) among Third-or-More Offenders per 100,000 Licensed Drivers and Adjusted ARIMA Results, July 2007–June 2013

County	Unadjusted rate					Adjusted ARIMA results				
	Pre-pilot	Pilot	Δ	$\Delta\%$	ω	SE_{ω}	t	$\Delta\%$	95% $CI_{\Delta\%}$	
All pilot counties	2.9	2.3	-0.6	-20.6	-0.0232	0.0228	-1.02	-2.3	-6.6	2.2
Alameda	3.5	2.8	-0.6	-18.1	-0.0383	0.0293	-1.31	-3.8	-9.1	1.9
Los Angeles	2.1	1.6	-0.4	-20.9	-0.0159	0.0423	-0.38	-1.6	-9.4	6.9
Sacramento	5.7	4.5	-1.2	-20.5	-0.0657	0.0655	-1.00	-6.4	-17.6	6.5
Tulare	11.7	8.8	-2.9	-24.9	0.0749	0.0742	1.01	7.8	-6.8	24.6
Non-pilot counties	4.6	3.4	-1.2	-25.9						

Note. DUI = Driving under the influence of alcohol or drugs (California Vehicle Code 23152 and 23153). Alcohol- or drug-reckless = Plea down from DUI (California Vehicle Code 23103). IID = Ignition Interlock Device. Pre-pilot = July 2007–June 2010. Pilot = July 2010–June 2013. Δ = Pre-post change. $\Delta\%$ = percentage change. ω = ARIMA adjusted estimate. SE_{ω} = Standard error of adjusted estimate. 95% $CI_{\Delta\%}$ = 95% confidence interval for the adjusted percentage change. The ARIMA structure parameters are not presented for sake of brevity. All ARIMA estimates are based on the natural log transformed series adjusted for the monthly conviction rate in the 54 non-pilot California counties, the U.S. average monthly retail price per gallon of gasoline, and the monthly California unemployment rate.

* $p < .05$, two-tailed from ARIMA model.

DISCUSSION

General Discussion of Findings

During the IID pilot program implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties, IID installation rates among DUI offenders in these counties increased dramatically. More than 40% of all DUI offenders in the pilot counties combined installed an IID in the 3-year follow-up pilot period, compared to about 2% during the 3-year pre-pilot period. Throughout the same time period, IID installation rates among all DUI offenders in the non-pilot counties increased modestly from less than 3% to a more than 4%. Almost half of all first DUI offenders from the pilot counties installed an IID during the pilot period, compared to one third of all second DUI offenders and one sixth of all third-or-more DUI offenders.

The main reason for the dramatic increase in IID installation rates among DUI offenders in pilot counties during the pilot period could be due to the fact that the IID pilot program is mandatory. That is, it affects all DUI offenders in pilot counties and makes IID installment for a predefined time period a condition for full license reinstatement. At the same time, other IID programs for DUI offenders in the state are optional. That is, they affect mostly repeat DUI offenders, and are a condition to obtain a restricted license while the offender is suspended or revoked rather than a condition for license reinstatement. Most DUI offenders in California are first DUI offenders (74%) and the IID installations among first DUI offenders accounted for 83% of the total IID installations among all DUI offenders in the pilot counties during the pilot period. So, the substantial increase in the IID installation rates during pilot vs. pre-pilot period, and the considerable difference in the overall IID installation rates between pilot and non-pilot counties after the implementation of AB 91 law is not surprising.

It can also be speculated that a part of the increase in the IID installation rate in pilot counties as well as most of the increase in non-pilot counties were likely a result of SB 598 legislation. In non-pilot counties, IID installation rates among second DUI offenders rose from about 6% to 15% during the pilot period. That is, this legislation was implemented on the same date as AB 91 law, and it provided valuable incentives to offenders convicted of second and third alcohol-only misdemeanor DUI through substantial reduction in their license suspension period. Second, alcohol-only misdemeanor DUI offenders were able to obtain an IID restricted license after only 90 days of hard suspension instead of 12 months, and third alcohol-only misdemeanor DUI offenders were able to obtain the same IID restricted license after 6 instead of 12 months of hard

suspension. In addition, because the same type of offenders, second and third alcohol-only misdemeanor DUI offenders, were also subject to AB 91 law in the pilot counties which mandated IID installment as a condition for full license reinstatement, it was likely that provisions of both of these legislations influenced second and third DUI offenders and gave them more reasons to install IID and comply with the law.

The IID installation rate for first DUI offenders across all pilot counties (46.7%) was comparable to the 47.7% installation rate for first DUI offenders observed in Florida's evaluation of their mandatory IID program (Voas et al., 2013). However, this installation rate is much lower than the IID installation rate observed in Santa Fe County, New Mexico's mandatory IID program (71%), which is not surprising considering that this New Mexico program used house arrest as the alternate sanction for DUI offenders who did not comply with IID requirement while that program was in place (Marques et al., 2010). When compared to the IID installation rate in other New Mexico courts (13%), the rate among first DUI offenders in pilot counties in the present study was substantially higher.

Overall, the IID pilot program implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties is not associated with a reduction in the number of first-time DUI convictions and repeat DUI offenses in the pilot counties. After adjusting for the change observed in the non-pilot counties and other covariates, the results of the ARIMA time series analyses showed that there were no differences in the license-based rates of DUI convictions in the pilot counties among first, second, and third-or-more DUI offenders during the pilot program as compared to the pre-pilot program. This was the case for each individual pilot county, as well as for all four pilot counties combined.

This finding might appear surprising considering the extensive difference found in IID installation rates among DUI offenders in the pilot counties during the pilot period vs. the pre-pilot period. However, as stated earlier, most DUI offenders who installed an IID were first DUI offenders who typically have lower DUI recidivism rates than repeat DUI offenders (Oulad Daoud & Tashima, 2014). Therefore, the IID pilot program may not have a general deterrent effect on these offenders. This would explain why the IID pilot program was not associated with a decrease in the rates of DUI convictions in the pilot counties.

Additional evidence that the IID program may not be effective among first DUI offenders comes from the previous evaluation of the effectiveness of IIDs in California (DeYoung et al., 2005) where no difference was found in the risk of subsequent DUI recidivism between first DUI offenders who were ordered to install IID compared to those who were not.

When alcohol- or drug-reckless convictions were combined with DUI convictions, the results of the ARIMA time series analyses indicated that the license-based rates of combined DUI/alcohol- or drug-reckless convictions in the pilot counties were found not to be different among first, second, and third-or-more DUI offenders between the pre-pilot and the pilot period. This conclusion applies to each individual pilot county. However, when all four pilot counties were combined, the adjusted license-based rates of combined DUI/alcohol- or drug-reckless convictions among second DUI offenders were 3.7% higher during the pilot period than during the pre-pilot period. The comparison of the same rates combined across all four counties among first and third-or-more DUI offenders were not found to be different during the pilot program as compared to the pre-pilot program.

Since an increase of convictions for DUI/alcohol- or drug-reckless was observed for second DUI offenders, a subsequent exploratory analysis (unpublished) was conducted to determine if there was a change in the number of only alcohol- or drug-reckless convictions in the pilot counties. This examination found that, after the IID pilot program was implemented, the rates of alcohol- or drug-reckless convictions increased in pilot counties. Other researchers have found a similar shift of convictions to lesser charges, which do not require the offender to install an IID (McCartt et al., 2013; Voas et al., 2013).

Limitations

While this evaluation did not find a general deterrent benefit of the IID pilot program in the four pilot counties, it is important to note that there are a few limitations to keep in mind when interpreting the results. First, since this is a general deterrence evaluation, it is not possible to draw conclusions about the IID pilot program effects on individual drivers. Specifically, a conclusion cannot be drawn whether the IID pilot program was associated with decreases in subsequent DUI recidivism among DUI offenders who were subject to these program requirements and who had to install IIDs as part of this program requirement. Second, since repeat DUI offenders typically have much longer suspension periods, the post-conviction follow-up time to capture their IID installations within the 3-year pilot period was insufficient for a considerable portion of these offenders. Third, it is possible that there were some additional

unknown biases that this study design could not rule out and that were not statistically controlled for in the ARIMA analyses. However, for such a bias to have any measurable impact on the analyses, the unmeasured variable would have to be unrelated to all of the other factors already included in the analyses. Finally, it was not possible to separate the influence SB 598 legislation (described above) might have had on the results of this evaluation.

Conclusion and Recommendation

The IID pilot program implemented in Alameda, Los Angeles, Sacramento, and Tulare Counties is not associated with a reduction in the number of first-time DUI convictions and repeat DUI offenses in the pilot counties. Therefore, the IID pilot program was not found to have a general deterrent effect on the occurrence of DUI convictions in designated pilot counties.

It is unclear whether it was reasonable to expect a general deterrent effect of this IID pilot program, since there is limited research available related to this area of research (Elder et al., 2011). Although, an effort was made in Washington State to determine the general deterrence effect of the IID program by using police reported single-vehicle late-night crashes as a surrogate for alcohol-related crashes. An 8% reduction in single-vehicle late-night crashes was found after the IID program in that state was extended to first DUI offenders with BAC levels below 0.15%. McCartt et al., (2013) suggested that states may wish to more broadly publicize their IID program to instill among the population of drivers a greater awareness that persons convicted of DUI must install an IID and comply with other program requirements. In general, for a law to have an influence on person's behaviors, a person must believe the consequences of violating a particular law are swift, certain, and severe (Ross, 1992). This is only plausible if potential offenders are aware of the law and the potential prescribed punishment (DeYoung, 1998). It is unknown whether and to what degree this IID pilot program was advertised in the four pilot counties or whether publicizing this pilot program would have had an effect in California. In other words, if the program was advertised, it is unknown whether this effort would have been effective in reaching all potential first and repeat DUI offenders and if it would have altered their behavior. In fact, past research suggests this outcome is doubtful. Prior research studies showed that distributing information related to specific traffic safety interventions and programs was not associated with reductions in subsequent convictions and crash involvement (Anderson, 1977; Masten & Peck, 2004).

Nonetheless, it was important to evaluate whether the IID pilot program has a general deterrent effect on the population of drivers in California to assess its capacity to have an influence on “would-be” DUI offenders before they engage in dangerous drinking and driving behavior. This was especially critical knowing that the majority of California DUI offenders are first DUI offenders or those who do not have a prior DUI conviction. Also, first DUI offenders in California account for most of drivers involved in fatal alcohol- and drug-related crashes (Oulad Daoud & Tashima, 2014).

Even though the IID pilot program was not found to have a general deterrent effect on the occurrence of DUI convictions in designated pilot counties, this evaluation does not provide information about the specific deterrence effect of this pilot program. To determine if this IID pilot program is associated with changes in the specific behavior of individual drivers who were convicted of DUI subsequent to the implementation of AB 91 law and thus were subject to the IID pilot program requirements, a separate, so called, specific deterrence evaluation needs to be conducted.

A specific deterrence evaluation will determine if there are differences in DUI recidivism and crashes between DUI offenders in the pilot counties who were subject to and comply with the IID pilot program and those who were not subject to the pilot program. Since the unit of the analyses for this evaluation will be the individual driver level, it requires sufficient follow-up time to capture subsequent DUI convictions among different types of DUI offenders. In addition, since there is a significant delay in the availability of police reported crash involvement data for California drivers in recent years, the specific deterrence evaluation could not have been conducted at this point in time.

A specific deterrence evaluation will provide additional crucial information on the effectiveness of the IID program and the effectiveness of IID devices among California DUI offenders, as designed under the AB 91 law. It is therefore recommended that subsequent legislative action take into consideration the findings of the specific deterrence evaluation of this pilot program. This evaluation is anticipated to be completed in the fall of 2015.

REFERENCES

- Anderson, J. W., (1977). *The effectiveness of traffic safety materials in influencing the driving performance of the general driving population* (Report No. 57). Sacramento: California Department of Motor Vehicles.
- Box, G. E. P., & Jenkins, G. M. (1970). *Time series analysis: Forecasting and control*. San Francisco, CA: Holden Day.
- Box, G. E. P., & Tiao, G. C. (1975). Intervention analysis with applications to econometric and environmental problems. *Journal of the American Statistical Association*, 70, 70–79.
- Bureau of Labor Statistics, United States Department of Labor. (2014). *Local area unemployment statistics*. Bureau of the Labor Statistics, Washington, DC. Retrieved February 20, 2014, from <http://www.bls.gov/lau/data.htm>
- California Department of Motor Vehicles. (2007–2013). *State age and sex report*. Sacramento, CA: Author.
- Chen, C., Liu, L. -M. (1993). Joint estimation of model parameters and outlier effects in time series. *Journal of the American Statistical Association*, 88, 284–297.
- DeYoung, D. J., (1998). *An evaluation of the general deterrent effect of vehicle impoundment on suspended and revoked drivers in California* (Report No. 180). Sacramento: California Department of Motor Vehicles.
- 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: California Department of Motor Vehicles.
- Elder, R. W., Voas, R., Beirness, D, Shults, R. A., Sleet, D. A., Nichols, J. L., Compton, R., and 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
- 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>
- Liu, L. (2006). *Time series analysis and forecasting*, 2nd ed. Villa Park, IL: Scientific Computing Associates Corp.

- Masten, S. V., & Peck, R. C. (2004). Problem driver remediation: A meta-analysis of the driver improvement literature. *Journal of Safety Research*, 35, 403–425.
- Marques, P. R., Voas, R. B., Roth, R., and 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.
- McCleary, R., & Hay, R. A. Jr. (1980). *Applied time series analysis for the social sciences*. Beverly Hills and London: Sage Publications.
- McDowall, D., McCleary, R., Meidinger, E. E., & Hay, R. A., Jr. (1980). *Interrupted time series analysis*. Beverly Hills, CA: Sage Publications.
- Oulad Daoud, S., & Tashima, H. N. (2014). *Annual report of the California DUI management information system. Annual report to the Legislature of the State of California* (Report No. 246). Sacramento: California Department of Motor Vehicles.
- Ross, H. L. (1992). Are DWI sanctions effective? *Alcohol, Drugs and Driving*, 8(1), 61–69.
- Tashima, H. N., & Helander, C. J. (1996). *Annual report of the California DUI management information system. Annual report to the Legislature of the State of California* (Report No. 159). Sacramento: California Department of Motor Vehicles.
- 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: California Department of Motor Vehicles.
- U.S. Energy Information Administration, U.S. Department of Energy. (2014). *U.S. regular all formulations retail gasoline prices (dollars per gallon)*. Washington, DC: U.S. Department of Energy. Retrieved February 20, 2014, from http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=M
- 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., Tippetts, A. S., & Grosz, M. (2013). Administrative reinstatement interlock programs: Florida, a 10-year study. *Alcohol Clinical & Experimental Research*, 37(7), 1243–1251.
- Yaffee, R. A. (2000). *Introduction to time series analysis and forecasting with applications of SAS and SPSS*. New York: Academic Press, Inc.

APPENDIX

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.