Effects of all-offender alcohol ignition interlock laws on recidivism and alcohol-related crashes

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Abstract

Background
Increasingly U.S. states mandate alcohol ignition interlock orders for all alcohol-impaired driving (DUI) convictions, but little research has examined their effects.

Aims
Examine effects on recidivism and alcohol-impaired crashes of Washington state’s ignition interlock laws, including a 2004 extension of the interlock requirement to all first DUI convictions and a 2009 law allowing interlocks in lieu of administrative license suspension; examine multi-state effects of interlock laws on alcohol-related fatal crashes.

Methods
Washington trends in conviction types and interlock installations for first DUI convictions were examined. Linear regressions examined recidivism rates with either law changes or interlock installation rates as predictors and all DUI arrests to control for enforcement variation. To examine general deterrence effects, times series cross-section regression was used to compare Washington single-vehicle late-night crash trends to California and Oregon trends and to examine effects of states’ interlock laws on alcohol-related fatal crash trends.

Results
After Washington’s 2004 law change, the interlock installation rate among affected offenders was about one-third compared to about 3-6% in the prior year. The 2-year recidivism rate declined 12% among affected offenders; a 0.06 percentage point decrease in recidivism was associated with each percentage point increase in the interlock use rate. The law change was associated with an 8% reduction in single-vehicle late-night crash risk. The 2009 law change appears to be having the desired effect of increasing interlock installations and ensuring they occur more quickly after arrest. Multi-state analysis of alcohol-related fatal crashes is underway.

Discussion and conclusions
Washington’s first-offender interlock laws were associated with reduced recidivism, even with low interlock use rates, and crash reductions. Additional gains may be achieved with higher interlock use rates, limiting reductions in DUI charges to other traffic offenses, and publicizing interlock laws.

Introduction
Alcohol-impaired driving (DUI) crash deaths fell sharply in the United States during the 1980s and early 1990s, but progress then stalled. In 2011, 31% of highway deaths occurred in crashes involving drivers with blood alcohol concentrations (BACs) of 0.08% or higher. Drivers with DUI convictions are overrepresented in fatal crashes (Fell, 1993) so that reducing recidivism potentially could lower deaths. A promising countermeasure is requiring alcohol ignition interlocks on convicted DUI offenders’ vehicles. As of April 2013, 19 states require all drivers convicted of DUI to install interlocks in order to drive during a driver's license suspension
and/or require interlocks for specified periods before full relicensure. In 23 states, such laws apply only to first offenders with high BACs (usually ≥0.15%) and/or repeat offenders.

Studies have found that offenders who install interlocks are less likely to recidivate than those who do not, but effects dissipate after interlock removal (Elder et al., 2011). Multiple offenders eligible for license reinstatement were randomly assigned to interlock-restricted licenses or to unrestricted licenses coupled with conventional treatment (Beck, Rauch, Baker, & Williams, 1999). Recidivism for the entire interlock group was 64% lower during the year following conviction, with 64% installing interlocks. The few studies examining the effects of interlock programs on offenders’ crashes had mixed findings (e.g., Bjerre, 2005; DeYoung, Tashima, & Masten, 2004).

The current research extends prior research by examining the effects of a law extending an interlock requirement to all first-time DUI convictions on the entire cohort of affected offenders and the association between the interlock installation rate and the rate of recidivism (McCartt, Leaf, Farmer, & Eichelberger, 2013). The general deterrent effects of ignition interlock laws on alcohol-related crashes also are examined.

Effects of Washington state’s interlock laws

Effective January 1, 1999, Washington courts were required to order interlocks, following conviction, for repeat offenders and for first offenders with “high BACs” (≥0.15%) or alcohol test refusals, including qualified offenders choosing the deferred prosecution track. In July 27, 2003, the issuance of interlock orders was moved from the courts to the Department of Licensing. Then, on June 10, 2004, the 1-year interlock order requirement was extended to first DUI convictions with BACs <0.15%, and offenders could reduce a 90-day pre-conviction, administrative license suspension by getting an interlock-restricted license after 30 days of the suspension. On January 1, 2009, the interlock program became available to offenders immediately after arrest, without the 30-day license suspension. This research examines effects of the 2003 and 2004 law changes and preliminary effects of the 2009 change.

Methods

Information on convictions resulting from DUI arrests was extracted in June 2012 from driver license record files. Trends in conviction types and interlock installations were examined for first alcohol-related convictions [“simple” (BAC <0.15%), high-BAC, and test refusal DUls; deferred prosecution; and alcohol-related negligent driving] stemming from arrests during 1999-2009. A 7-year window was used to identify first offenses. Conviction types and interlock installations were tracked by quarter, indexed to date of arrest.

Trends in recidivism for up to 3 years after arrest were examined for first simple DUI and all first DUI convictions resulting from arrests during January 1999-June 2004. Linear regressions on recidivism rates were examined with the 2003 and 2004 law changes or the proportion of offenders who installed interlocks as predictors and all DUI arrests as a control for potential enforcement variation. The proportions of offenders in each arrest quarter who recidivated within 2 years were modeled as a function of three time trend variables (number of quarters since January 1999, number of quarters squared, number of quarters cubed), a count of all DUI arrests for the quarter, and indicator variables coded as 1 for arrests occurring during or after the third quarter of 2003 and as 1 for arrests occurring during or after the third quarter of 2004.

To examine general deterrent effects of the 2003 and 2004 law changes, time series cross-section regression compared trends in single-vehicle late-night (midnight-3 a.m.) crashes in
Washington during 2001-07 to trends in California and Oregon, nearby states without important changes in DUI laws during this period. The dependent variable was the logarithm of the seasonally adjusted percentage of single-vehicle late-night crashes for each state and each quarter. Predictor variables included time parameters for each quarter, cross-sectional parameters for each state, and indicator variables for Washington for the law changes.

Results for study of Washington state’s interlock laws

Trends in conviction types and interlock installations

During 1999-2009, the quarterly number of convictions from DUI arrests fluctuated between about 8,000 and 10,500; consistently, about three-quarters were first convictions. A possible effect of interlock law changes would be shifts in DUI-related conviction types. The proportion of first DUI-related convictions that were alcohol-related negligent driving (without an interlock requirement) trended upward during 1999-2007 and then levelled off (Figure 1a). These convictions were about one-third of all first DUI-related convictions in 1999, 40% during 2005, and half at the end of 2009. The proportions of first high-BAC and test refusal DUIs and deferred prosecutions trended downward during 1999-2009. The proportion of first simple DUI convictions trended up from 1999 to mid-2003 and then down, until levelling off in 2008; these convictions were about one-third of first DUI-related convictions in January-March 1999 and in October-December 2009.

Figure 1a. Distribution of first DUI-related convictions by type, by arrest quarter, 1999-2009.

Figure 1b. Percent of first DUI-related conviction types with interlocks installed, by arrest quarter, 1999-2009.

After June 2004, when interlock orders were extended to first simple DUI convictions, the rate of installations was highest for deferred prosecutions, followed by first simple and high-BAC DUI convictions, and then first test refusal DUI convictions (Figure 1b). The installation rate for alcohol-related negligent driving convictions was about 8% until increasing in mid-2008 through 2009 to 16-19%. Interlock orders were not required for this group, but installing an interlock could be a condition of plea reduction agreements with courts. It is apparent that the 2004 law change led to a substantial increase in the interlock installation rate for first simple DUI offenses, the convictions directly affected (Figure 1b). The 2009 law change, which allowed an interlock-restricted license in lieu of a 30-day license suspension after arrest, appeared to increase installations for all conviction types. For first simple DUI convictions, the installation rate was very low prior to 2004. It then increased to 6% in the first quarter of 2004; to 13% in the second quarter, when some of these offenders were covered by the interlock requirement; and to 30% in the third quarter, after all were covered. The rate then remained at about one-third until the last quarter of 2008, when it increased to 37%. During the last quarter of 2009, interlock installations were recorded for 29% of all DUI-related convictions.
It also appears that the 2009 law change led to earlier installations of interlocks. As shown in Figure 2, first simple DUI offenders were not only more likely to install interlocks after the law change, but also more likely to install them sooner after arrest. For example, for first simple DUI offenders arrested during January 2004-December 2008, prior to the 2009 law change, 6% had installed interlocks by the end of 6 months after arrest, compared to 16% during 2009.

![Figure 2. Cumulative percent of interlock installations by number of months elapsed after arrest for first simple DUI offenders arrested before (June 10, 2004-December 31, 2008) and after (January 1-December 31, 2009) January 1, 2009 law change.](image)

**Effects of 2003 and 2004 law changes and interlock installation rate on recidivism**

The regression model for the 2-year cumulative recidivism rate for first simple DUI convictions estimated a reduction of 1.3 percentage points associated with the 2004 law change (p=0.04). For example, for offenders arrested during April-June 2006, the model estimates a 12% reduction, from an expected 10.6% recidivism rate without the law change to 9.3%. The model for all first DUI offenses estimated a 1.1 percentage point reduction (p=0.02). Neither model found a significant effect associated with the 2003 law change. To assist in interpreting the model results, Figure 3 shows trends in the rates of 2-year cumulative recidivism rates for first simple DUI convictions in the absence of the 2004 law change and the rates in the presence of the law change (after adjustment for covariates). The recidivism rates were generally increasing until the third quarter of 2004. They would have been expected to continue increasing and later level off (as in the dashed line) if there had been no law change. Instead, the rates declined.

![Figure 3. Predicted cumulative 2-year recidivism rate for first simple DUI convictions with and without 2004 law change, by quarter of arrest, January 1999-June 2006.](image)
Regression models of the effect of interlock installation rates on recidivism rates indicated an estimated 0.06 percentage point decrease in the 2-year cumulative recidivism rate for each percentage point increase in the proportion of first simple DUI offenders with interlocks. An estimated 0.08 percentage point decrease in the recidivism rate of all offenders with DUI-related convictions is predicted for each percentage point increase in the interlock installation rate (\(p=0.05\)).

Effects of 2003 and 2004 law changes on crashes

Table 1 summarizes the regression model of the percentage of crashes that were single-vehicle late-night by state and quarter during 2001-07 (time-series parameters for each quarter not shown). The inverse logarithms of the cross-sectional parameters represent the predicted percentage of crashes that would be single-vehicle late-night at the end of the time series if trends were similar across states — i.e., 2.8 for California, 2.1 for Oregon, and 3.5 for Washington. The coefficient of the Department of Licensing parameter (2003 law change) is -0.06623, a non-significant estimate. The inverse logarithm of this parameter can be interpreted as a 6.4% decrease in single-vehicle late-night crash risk in Washington beginning in the third quarter of 2003, relative to trends in California and Oregon. The coefficient of the parameter for the all-offender interlock order requirement (2004 law change) is -0.08636, a significant estimate. The inverse logarithm of this parameter can be interpreted as an 8.3% decrease in single-vehicle late-night crash risk in Washington beginning in the third quarter of 2004.

Table 1. Police-reported crashes during 2001-07 in California, Oregon, and Washington: time series cross-sectional regression of log of deseasonalized single-vehicle late-night (midnight-3 a.m.) crash percent.

| Variable                                | Parameter estimate | Standard error | t value | Pr > |t| |
|-----------------------------------------|--------------------|----------------|---------|------|---|
| Cross sectional effect, California      | 1.046334           | 0.0308         | 34.01   | <0.0001 |
| Cross sectional effect, Oregon         | 0.725778           | 0.0308         | 23.59   | <0.0001 |
| Cross sectional effect, Washington     | 1.266336           | 0.0359         | 35.25   | <0.0001 |
| Change, DOL issuing interlock orders   | -0.06623           | 0.0370         | -1.79   | 0.0792 |
| Change, all offender interlock order requirement | -0.08636 | 0.0354 | -2.44 | 0.0183 |

Alcohol-related fatal crash trends for states with vs. without all-offender interlock laws

For all 50 states and the District of Columbia, interlock laws in each quarter during 2000-11 were coded as no mandatory interlock law or one or more of the following: law applying to repeat DUI convictions, law applying to high-BAC DUI convictions, law applying to first DUI convictions. Initial models were constructed for the percentage of fatal crashes that were single-vehicle nighttime (9 p.m.-6 a.m.) and the percentages of drivers involved in fatal crashes with BAC\(\geq 0.08\). The models included the logarithm of the seasonally adjusted percentage of crashes as the dependent variable and cross-sectional parameters for each state (the 10 states with no mandatory interlock law were grouped); indicators for quarters during which the repeat offender, high-BAC, or first-offender laws were in effect; and time-series parameters for each quarter. In these initial analyses, the data were highly variable and effects of the laws were small and not statistically significant. More complete analyses are underway. These will consider, for example, matching law-change states with nearby states without law changes and consider predictors such as the quarterly rate of unemployment in each state that may have affected alcohol-impaired driving trends during the study period.
Discussion and conclusions

The Washington law pertaining to ignition interlocks for DUI convictions has evolved by expanding the types of convictions covered, moving responsibility for issuing interlock orders from the courts to the driver licensing agency, and making interlocks available sooner after arrest. Extending an interlock order requirement to all first DUI convictions was associated with reductions in recidivism, even with low interlock use rates, and additional gains are likely achievable with higher use rates. A 2009 law change allowing interlock installation immediately after arrest, in lieu of a 30-day license suspension, appears to be having the desired effect of increasing installations and ensuring they occur more quickly after arrest. It is too soon to evaluate a major January 2011 law change, which provides that an unrestricted driver’s license can be restored only after drivers have had an interlock installed for at least 4 months without any reports of noncompliance. Washington state and other jurisdictions should continue to identify ways to increase interlock use rates and reconsider allowing reductions in DUI charges to other traffic offenses without interlock order requirements.

The crash reduction associated with Washington state’s all-offender law suggests that all-offender interlock laws can have a general deterrent effect. This is being further explored through cross-state analyses relating interlock laws to alcohol-impaired fatal crash trends.

References


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